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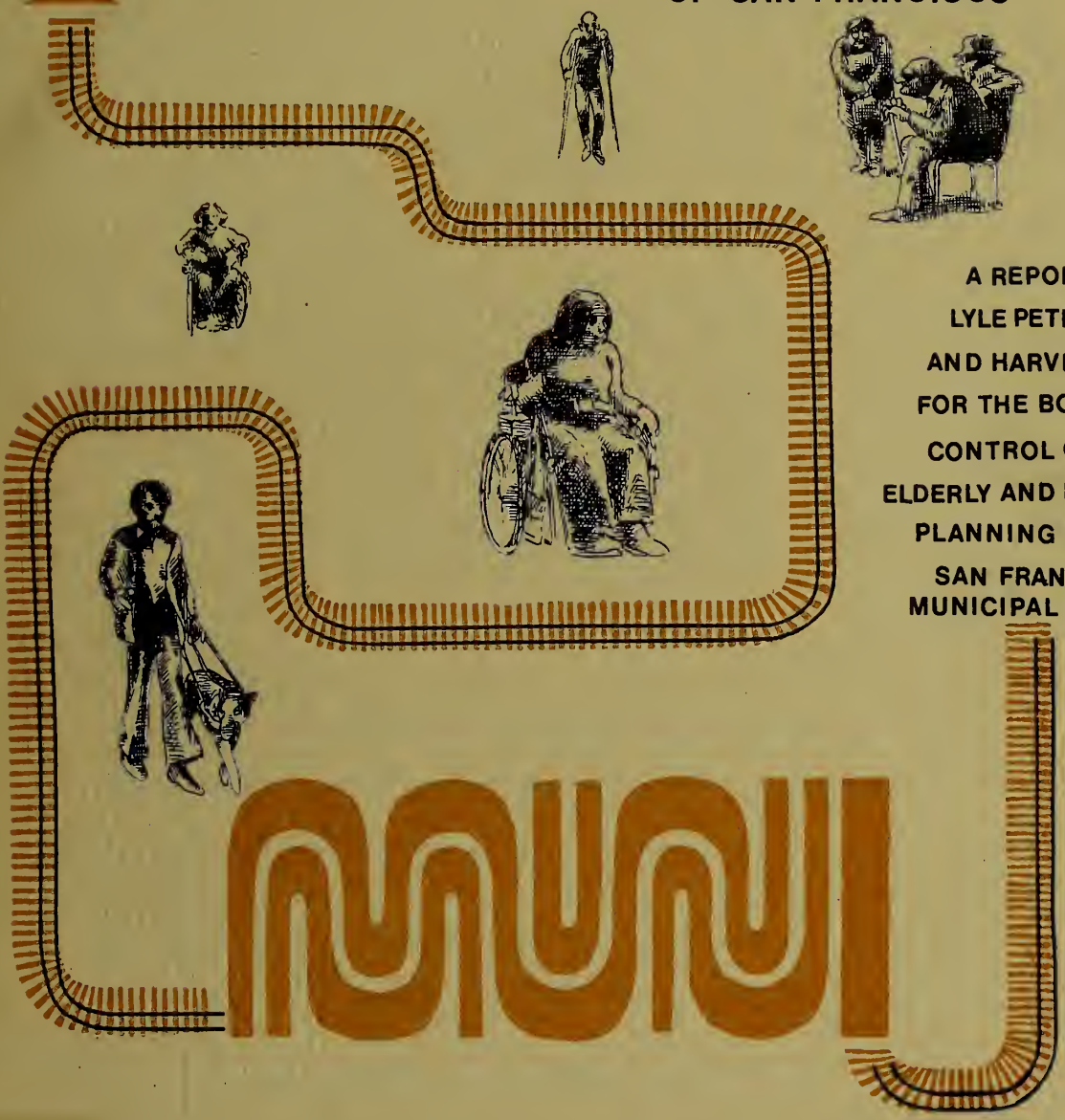

A REPORT BY
LYLE PETERSON
AND HARVEY KATZ
FOR THE BOARD OF
CONTROL OF THE
ELDERLY AND HANDICAPPED
PLANNING PROJECT
SAN FRANCISCO
MUNICIPAL RAILWAY

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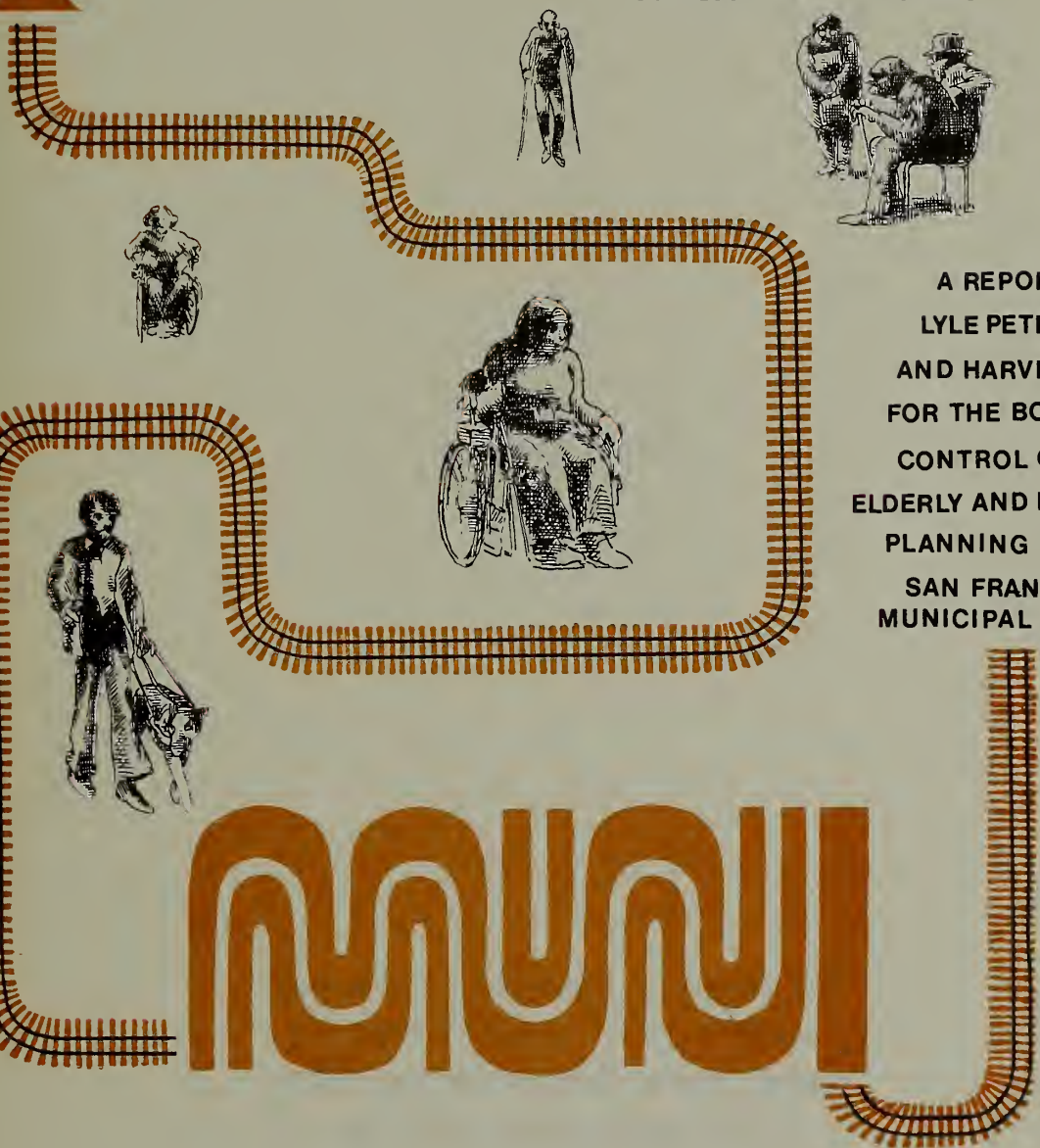

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TRANSPORTATION PLAN FOR THE ELDERLY AND HANDICAPPED OF SAN FRANCISCO

JANUARY, 1979

Report by Lyle Peterson and Harvey Katz
For the Board of Control of the
Elderly and Handicapped Planning Project
San Francisco Municipal Railway

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INTRODUCTION

Awareness of the transportation problems of the elderly and handicapped has increased considerably in the past few years partly due to Congressional enactment of Section 16 of the Urban Mass Transportation Act of 1964, as amended. This amendment declared "...the national policy that elderly and handicapped persons have the same rights as other persons to utilize mass transportation facilities and service." In light of this statement, this study is being undertaken by the San Francisco Municipal Railway (MUNI) to assess the mobility needs of San Francisco's elderly and handicapped population, and to identify and evaluate methods for meeting those needs. This introduction will summarize our approach to the various study tasks and the findings that resulted from them.

It was first necessary to define and enumerate the number of elderly and handicapped people living in San Francisco and to similarly describe the "transportation handicapped" population. Although the total population of San Francisco has been declining, the number of elderly people has been increasing. We estimate that 1 out of every 6 persons in San Francisco is 65 years old or older. Approximately one third of the elderly are handicapped. The younger disabled population, ages 16-64 is about 57,000 and the total disabled population, 16 years of age and older, is about 91,900 or 13.8% of the total population.

It was more difficult to identify the "transportation handicapped" - those people that either cannot use transit or have difficulty using it in its present form - because there is no direct data on this group. We have estimated the population of this group to be 59,300 or 8.9% of the total population.

According to nationally derived trip making rates, San Francisco's transportation-handicapped population makes 1,647,000 trips per month. Although this seems to be a great many trips, an equal number of able bodied people would make almost twice as many trips per month, in large part because much more transportation is available to them.

These trips are made on all existing transportation modes including mass transit because many transportation handicapped are still able to use mass transit with some difficulty. The transportation handicapped also make use of paratransit services offered by 25 San Francisco organizations. Most of these organizations are social service agencies that provide trips for their clients. Together they provide about 2,000 trips per day, mostly for medical/health reasons. These trips have the highest priority and there aren't enough resources to provide trips for other purposes.

This study examined several different transportation alternatives as possible solutions to the transportation problems of the elderly and handicapped:

FIXED ROUTE SERVICE

1. **MUNI FULL ACCESSIBILITY**
2. **MUNI PARTIAL ACCESSIBILITY** (100% of streetcar system and 50% of coach system would be accessible to those in wheelchairs)
3. **MUNI SPECIFIED ROUTE ACCESSIBILITY**

DEMAND RESPONSIVE SERVICE

4. **MUNI** - Operated, Area Wide Service
5. **SUBSIDIZED TAXI SERVICE**
6. **CONTRACT SERVICE**

These alternatives were compared to one another and measured against a set of criteria. These criteria include:

1. **Equivalency Criteria:** A set of criteria designed to test whether alternative transportation for the elderly and handicapped would offer the same level of service as that available to able bodied users of public transit.

2. **Institutional Criteria:** Including goals and policies, legal requirements, and social integration.

3. **Economic Criteria** including capital and operating costs and patronage potential.

The analysis of alternatives indicates that accessibility to fixed-route systems is the best solution to the transportation problems of the elderly and handicapped and that a totally accessible fixed route system is more cost effective and provides a higher level of service than partially accessible fixed route systems.

Following is a listing of the more important findings. The reader is also referred to the Summary Table 5.12.

1. Fixed-Route Full Accessibility provides a level of service most nearly equivalent to that enjoyed by able-bodied transit users.

2. Fixed-Route Full Accessibility best conforms to institutional criteria by meeting previously stated legal and policy positions, by integrating the transportation handicapped with the general population, and by offering extensive geographic coverage and service throughout the day and night.

3. Demand-Responsive systems on a large scale are very expensive to operate.

4. Cost per passenger trip is less for Fixed-Route Full Accessibility than for all other alternatives.

5. Fixed-Route Full Accessibility would potentially serve more elderly and handicapped passengers than any other alternative.

6. Subsidized Taxi service would be very expensive and would still exclude some handicapped people.

7. A Demand-Responsive service operated by MUNI would be more expensive than a similar service contracted out to another operator.

8. Governmental bodies from the local level (San Francisco Public Utilities Commission and Board of Supervisors) to the national level (U.S.D.O.T.) have stated their support for full accessibility to mass transit systems for the elderly and handicapped.

The basic findings of this study have been incorporated into a group of recommendations from the study's Board of Control. A listing of these recommendations follows here, and a more detailed listing, with explanation, comprises Chapter 6 below.

BOARD OF CONTROL RECOMMENDATIONS

I. THE MUNI FIXED ROUTE SYSTEM SHOULD BE MADE FULLY ACCESSIBLE TO THE ELDERLY AND HANDICAPPED.

A. MUNI Metro should be accessible when put into operation.

B. The MUNI coach fleet (diesel and electric) should be made fully accessible by implementing a scheduled program to retrofit existing coaches with accessibility devices and by purchasing only accessible vehicles when older MUNI coaches are retired from service.

C. The overall problem of boarding and leaving the transit vehicles, including waiting at the loading zone, mounting the vehicle, paying the fare, and safely finding a seat is critical to the operation of an accessible transit system.

D. Because technology for transit accessibility is in its first generation, its "state of the art" should be continually explored by MUNI and improvements incorporated into the MUNI system.

E. MUNI needs to establish a marketing and community outreach program to actively seek increased patronage among the elderly and handicapped.

F. The existing drivers' training program should be expanded with regard to accessibility, including sensitivity to the conditions and needs of the elderly and handicapped and operating instructions for accessibility equipment.

II. OTHER TRANSPORTATION SERVICES

A. MUNI should establish a pilot off-peak charter and shuttle service (using regular MUNI vehicles) for groups of elderly and ambulatory handicapped.

B. MUNI should participate in a county-wide paratransit coordinating council.

CHAPTER 1

ESTIMATES OF THE ELDERLY AND HANDICAPPED POPULATION OF SAN FRANCISCO

Introduction

In order to fully plan for the transportation of the elderly and handicapped it is necessary to document the incidence of the elderly and handicapped in the total population. However, it should be noted that because an individual is either elderly or handicapped doesn't necessarily mean that that person is unable to use transit. The remainder of this first section will attempt to identify the incidence of the elderly (65 years of age and over) and the handicapped, and to identify what is understood in the transit field as "transportation handicapped" -- that group of people that either cannot use transit or have difficulty using transit in its present form.

I. Elderly Population

The United States Census of Population is one of the most extensive, up-to-date and widely used reference sources available for planning purposes. According to the 1970 Census the total population of the City and County of San Francisco was about 715,675, a drop of 3.3% from the 1960 population of 740,320. This was the first 10 year period when the population of San Francisco declined.

The July, 1976 Statistical Report (San Francisco Public Health Department) estimated that the total population of San Francisco is 664,400, a drop of 7.1% from 1970. Population for 1978[1] is projected at 655,560, a drop of 8.4% from 1970.

---

(1) State of California, Department of Finance.

In 1960, the elderly population of San Francisco was 93,600; and by 1970, it had increased by 6.5% to 99,740. Elderly population has continued to increase even as total population was decreasing. In 1978, it is estimated that 102,600 elderly people live in San Francisco, 15.6% of the total population. Table 1.1 shows this trend of declining general population and increasing elderly population.

Table 1.2 compares the makeup of San Francisco's population with that of the San Francisco-Oakland Metropolitan area (SMSA) and the entire country. It is apparent that the City of San Francisco has a very high proportion of elderly people.

TABLE 1.1

City and County of San Francisco Population Trend
Between 1960 and 1978

	Year	Total Population	% Change of Total Population	Elderly Population	% Change of Elderly Population	% Elderly of Total Population
	1960	740,320	--	93,600	-	12.6%
	1970	715,675	-3.3%	99,740	+6.5%	13.9%
(Estimate)	1976	664,400	-7.1%(1)	100,400	+0.7%(1)	15.1%
(Estimate)	1978	655,560	-8.4%(1)	102,625	+2.9%(1)	15.6%

(1) Percent change based on 1970 total population.

TABLE 1.2

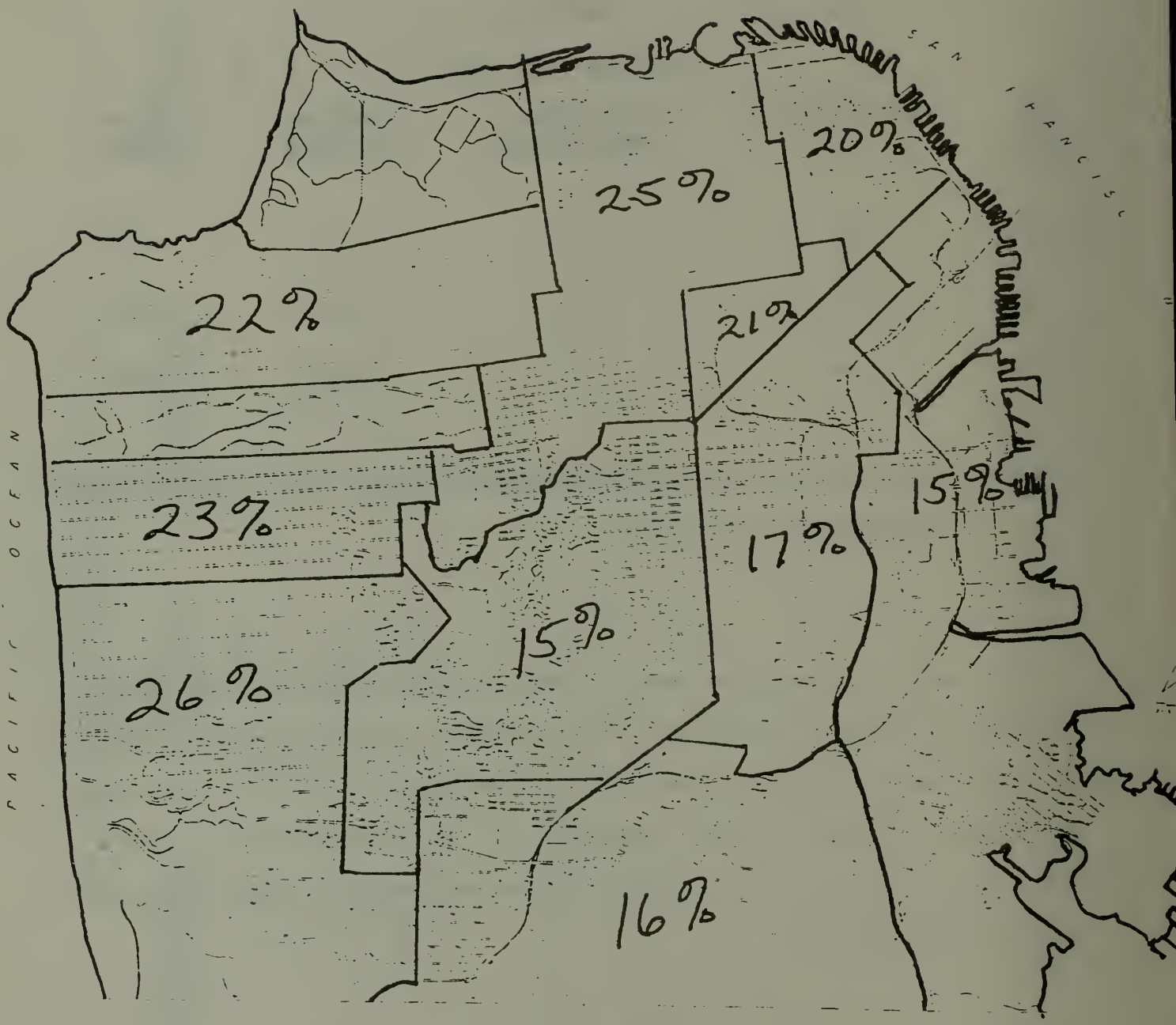
1970 Age Distribution*

Age Group	San Francisco	San Francisco Oakland-SMSA	State of California	United States
65 to 74	8.7%	5.8%	5.5%	6.3%
75 to -	5.2%	3.7%	3.5%	3.9%
Total %	13.9%	9.5%	9.0%	10.2%

*Source: Wilbur Smith & Associates, Planning, Operations Marketing For the San Francisco Municipal Railway, June 1977.

A final observation regarding the elderly is their location by geographic area. Figure 1.1 identifies the elderly by location based on the year 1970. This breakdown was provided by the Commission On Aging, City and County of San Francisco. Figure 1.1 was initially identified by zip code and then aggregated into the ten zones, each consisting of approximately the same number of people. It shows the elderly percentages in each zone in the City of San Francisco.

FIGURE 1.1



Percentage of persons 60 years of age or over.*

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* Commission On Aging, City and County of San Francisco

Percentages on this figure are higher than the total percentage of elderly presented in the text because the Commission on Aging defines the elderly as persons 60 years and older, not 65 and over.

II. Handicapped Population

The U.S. Census Reports and other related sources of information provide invaluable assistance in the identification, quantification and distribution of elderly. Unfortunately, no authoritative source of information is available to identify the total handicapped population. Consequently, the task of identifying the total handicapped population becomes extremely difficult, if not impossible.

Data on the number of disabled is most reliable on a limited basis. In 1970, the Bureau of Census gathered information on those persons 16-64 years of age, hindered from working because of a health or physical condition. The obvious problem is that no census data is available for the handicapped population under 16 and over 65 years of age.

In order to overcome this deficiency, numerous efforts were undertaken, but all proved to be of little help. Social service agencies in San Francisco were contacted, as well as both state and federal offices where it was felt that we might find additional data. In most cases we were referred to the 1970 Census. Consequently, the number of those persons that are 65 years of age and over and handicapped will be based on "reasonableness".[1] This will be at best a rough approximation, but will provide us with some information to work with regarding the numbers of persons that are handicapped. Following is a discussion identifying:

- Handicapped 16-64 years of age;
- Elderly handicapped; and
- Total handicapped population (16 years and older).

---

(1) At this time there is no reliable data or method to derive persons under 16 who are handicapped. It is felt that this group is much smaller compared with persons over 65 years of age and also this group does not make up a significant portion of transit users. Consequently, our estimates of "total handicapped population" actually include only those 16 years of age and older.

A. Handicapped 16-64 Years of Age - As mentioned above, the 1970 Census[2] did ask a question regarding handicapped persons 16-64 years of age. This is by far the most reliable source of data identifying handicapped. Based on the results of the 1970 Census, there are approximately 50,000 persons between the ages of 16-64 considered handicapped in San Francisco.

Even this data, however, has been criticized. It is felt by some that the 1970 Census substantially undercounted the number of disabled persons due to respondents' failure to recognize some handicaps as such and also the reluctance of some to admit any condition that may have a social stigma attached. Consequently, since 1970 several efforts have been undertaken to update and develop more reasonable estimates.

Two different estimates were prepared during 1975. These estimates were done by:

- Health Systems Agency (formerly Comprehensive Health Planning Council); and
- State of California, Department of Rehabilitation.

Both organizations categorized their estimates by type of handicap. The Health Systems Agency estimated San Francisco's disabled between the age of 16 and 64 to be about 58,000, while the Department of Rehabilitation estimated about 56,000. Table 1.3 identifies the breakdown by type of handicap.

---

(2) The Census provides information only on the number of disabled persons 16-64 years of age obtained through a five percent sample.

B. Elderly Handicapped - As noted earlier there is tremendous difficulty in identifying those persons who are elderly handicapped. There is no specific Census data available regarding this group, however, a national incidence rate of the elderly that are handicapped has been developed. This incidence rate is based on national statistics outlined in the report, "Handicapped and Elderly Market for Urban Mass Transit".[3]

The reasoning behind this incidence rate is the understanding that the incidence of disabilities is generally higher among the elderly than among the young or middle aged. The report, "Handicapped and Elderly Market for Mass Transit", has identified one third of the elderly as handicapped. If we accept that this is true for San Francisco, then we can derive the number of elderly that are handicapped.

Using the 1978 estimated elderly population of 102,600 and applying the incidence rate of .34 yields a total estimate of 34,900 persons 65 years of age and over who are handicapped.

---

(3) Urban Mass Transportation Administration, "Handicapped and Elderly Market for Urban Mass Transit", October, 1973.

TABLE 1.3

Handicapped Population By Type Ages 16-64 (1975)
For the City and County of San Francisco

Type of Handicap	Health Systems Agency	State of California Department of Rehabilitation
Mentally Retarded	12,200	11,910
Epileptic	2,700	1,400
Blind	600	590
Visually Impaired	1,700	1,540
Hearing Impaired (includes Deaf)	1,410	1,380
Amputees and Orthopedic Disorders	27,650	27,180
Heart	9,620	9,460
Other Physical Disorders	2,080	2,540
	57,960*	56,000*

* Average of the two about 57,000

C. **Total Handicapped 16 Years and Older** - Combining the number of handicapped between the ages of 16 and 64, 57,000, and the number of handicapped 65 years of age and over, 34,900, yields an estimate of about 91,900 handicapped persons living in San Francisco. Thus approximately 13.8% of the total population of the City of San Francisco are handicapped.

III. Transportation Handicapped Population

An individual, because he is either elderly or disabled isn't necessarily unable to use transit. The handicapped differ greatly from each other in the severity and extent of their disabilities, attitude toward their physical and mental limitations, incomes, ages, and mobility. Consequently, although it is estimated that 91,900 persons 16 years and older have been identified as handicapped, not all of these persons are transportation handicapped.

The Urban Mass Transportation Act of 1964, Section 16(c), as amended, classified the transportation handicapped person as "any individual who, by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, is unable without special facilities or special planning or design to utilize mass transportation facilities as effectively as persons who are not so affected". The remainder of this section will attempt to identify the transportation handicapped--that group of people that either cannot use transit or has difficulty using transit in its present form.

Not surprisingly, at this time there is no consensus as to the number of transportation handicapped persons, either nationally or locally, although there have been several serious efforts made by some organizations to derive the number of transportation handicapped. Following is a discussion of a methodology that was developed by the Urban Mass Transportation Administration in conjunction with the Transportation Systems Center (TSC) to identify the number of transportation handicapped.[4]

A. **UMTA TSC Estimation Procedure** - This methodology is based on a handicap classification method. The handicapped were divided into institutional and non-institutional populations. The non-institutional population includes people with chronic conditions (conditions lasting three months or more) and those with acute conditions (disabilities lasting less than three months and that are expected to be temporary). The chronic and acute conditions that were selected were considered most likely to cause mobility limitations. The institutional populations include those in homes for the aged and homes and schools for the physically handicapped.

This handicap classification method to identify the transportation handicapped provides estimates by type of handicap including:

- Visual impairments (including blind);[5]
- Hearing impairments (deaf persons with difficulty speaking);[5]

---

(4) Ibid

(5) National Health Survey, Prevalence of Selected Impairments, United States-1971. U.S. Department of Health, Education and Welfare; Public Health Service; Health Resources Administration; National Center for Health Statistics, Rockville, Maryland, Series 10, Number 99, 1975.

- Wheelchair confined;[6]
- Use of walker;[6]
- Use of other special aids[6]; and
- Other minor mobility limitations.[7]

In the UMTA-TSC study, incidence rates were derived for each of the above conditions according to their prevalence in the national population. They were applied to the non-institutional and institutional populations of San Francisco.

B. Application of Incidence Rates to the City of San Francisco - The incidence rates were applied on the assumption that the proportion of the transportation handicapped living in San Francisco is at least the same as that found in the total United States population. Thus, applying the rates for each handicap category makes it possible to develop order-of-magnitude estimates of the transportation handicapped living in San Francisco.

The results that follow are derived from 1975 agency data. The application of the incidence rates yield approximately 53,300 persons who have transportation dysfunctions due to some type of physical impairment. The categorization of these handicaps is found in Table 1.4, Transportation Handicapped By Type (1975).

---

(6) National Health Survey, Use of Special Aids, United States-1969. U.S. Department of Health, Education and Welfare; Public Health Service; Health Services and Mental Health Administration; National Center for Health Statistics, Rockville, Maryland, Series 10, Number 78, 1972.

(7) National Health Survey, Limitation of Activity and Mobility Due to Chronic Conditions, United States-1972. U.S. Department of Health, Education and Welfare; Public Health Service; Health Resources Administration; National Center for Health Statistics, Rockville, Maryland, Series 10, Number 96, 1974.

TABLE 1.4

Transportation Handicapped By Type (1975)

Type of Non-Institutionalized Handicaps	Elderly Handicapped	Non-Elderly Handicapped	Total
Visual Impairment	7,386	5,377	12,763
Hearing Impairment	711	357	1,068
Uses Wheelchair	1,168	234	1,402
Uses Walker	1,788	161	1,949
Other Special Aids (Crutches, Canes)	11,582	6,371	17,953
Other Minor Mobility Limitations	7,803	3,076	10,879
Temporary Restrictions	303	1,299	1,602
Subtotal	30,741	16,875	47,616
Institutionalized	5,589	100	5,689
Total	36,330	16,975	53,305

Table 1.4 does not contain information on the mentally handicapped. The Developmental Disabilities Area Board V estimates the 1976 prevalence of mental retardation in San Francisco to be about 12,050 persons.(8) This total can be broken down according to ability to use public transit.(9) Approximately 5,300 have no difficulty and another 720 will never be able to use a conventional transit system. Consequently, there exists a middle group of approximately 6,000 (about 5,580 non-elderly and 450 elderly) mentally retarded persons who could use a conventional transit system if they were given some form of travel training.

---

(8) Developmental Disabilities Area Board V, Developmental Disabilities Plan for Area V, January, 1977.

(9) President's Committee on Mental Retardation, Transportation and the Mentally Retarded, June, 1972.

C. **Total Transportation Handicapped 16 Years and Older**- Combining the estimate of Table 4, Transportation Handicapped By Type, which estimates the transportation handicapped to approximate 53,300 persons, and the 6,000 persons who are mentally retarded with some sort of transportation dysfunction, yields a total of about 59,300 transportation handicapped persons 16 years and older. These peoples' mobility could be improved by identifying and implementing solutions to meet their transportation needs.

As was noted earlier only part of the handicapped population would be considered transportation handicapped. Table 1.5 summarizes the significant demographic data that has been outlined throughout the preceding pages. Although the conclusions reflect 1975 data, it is the most complete and reliable data that could be gathered and derived. The importance of this data is not in the actual number of transportation handicapped, but in the fact that it provides us with an order-of-magnitude and an index to gauging transportation programs to meet the needs of specific handicaps. About 91,900 persons, or 13.8% of San Francisco's residents are handicapped, while 59,300 or 8.9% are transportation handicapped.

TABLE 1.5

Summary: Total Population, Elderly, Handicapped and Transportation Handicapped in the City and County of San Francisco (1975)

	Total Population	Handicapped	% Handicapped of Total Population	Transportation Handicapped	% Transportation Handicapped of Total Population
Non-Elderly (under 65)	567,780	57,000	10.0%	22,559	3.9%
Elderly (65 and over)	102,600[1]	34,900	34.0%	36,771[2]	36.1%
Total	670,400	91,900	13.7%	59,300	8.9%

(1) 1978 Population Estimate

(2) The fact that the elderly number of transportation handicapped is greater than elderly handicapped is due in part because the numbers are derived by different methodologies.

IV. Potential Transportation Demand

As stated above, the handicapped differ greatly from each other in the extent of their disabilities. There are also important differences among those that this study has classified as transportation-handicapped. Even those with severe disabilities are able to lead very active lives as shown by the many disabled people who hold full time jobs or who are full time students. There are a great many active though disabled people who would make as many trips as the able-bodied if given the chance. The increase in trip making that would result from provision of transportation for the elderly and handicapped would bring about increased opportunities for employment, education, social activities, etc. for a great many people.

UMTA has suggested under 49 CFR 613.204 in the Congressional Register of April 30, 1976 that one way to meet its requirements for special efforts for elderly and handicapped transportation would be provision of 10 roundtrips per week for every wheelchair user or semiambulatory person. This may be adequate for many transportation handicapped people as a reasonable minimum provision of service, but a greater quantity of transportation may be required for the active disabled.

It is presently estimated that the transportation handicapped make an average of 28.6 trips/month and that the able-bodied make 54.8 trips/month.[1] Applying these data to San Francisco's transportation handicapped population of 59,300 gives an estimate of 1,647,000 trips/month.

---

(1) Summary Report of Data from National Survey of Transportation Handicapped People, DOT-UMTA, June, 1978.

The service changes that will be recommended as a result of this study are aimed at the needs of the 59,300 transportation handicapped although any changes to MUNI system would more than likely benefit all its users. In addition, improvements in MUNI would also help other transportation handicapped from the entire 3,000,000 person San Francisco-Oakland Metropolitan Area. Freedom of mobility throughout the region could become a reality through transit links with the presently accessible BART and SamTrans (San Mateo County) transit systems. For a more complete discussion of E&H potential transportation demand, please see Chapter 4, part III C.

CHAPTER 2

ANALYSIS OF EXISTING OPERATIONS

I. San Francisco Municipal Railway

The San Francisco Municipal Railway (MUNI), is one of the largest and most heavily traveled transit systems in the United States. The MUNI operates over 85,200 daily scheduled miles of transit services, and carries approximately 500,000 patrons on an average weekday. MUNI provides more vehicle hours of service to San Franciscans on a per capital basis than are furnished the users of any other transit system in the nation.

The MUNI operates 115 streetcars, 345 electric trolley coaches, 503 motor coaches, and 40 cable cars for a total of 1003 vehicles logging 26 million miles annually over 76 routes amounting to about 725 route miles.

MUNI is engaged in a $290 million modernization program. This capital improvement effort is segmented into four distinct elements:

Transit Equipment Program (TEP) $67 million

Transit Improvement Program (TIP) $97 million

Power Improvement Program (PIP) $58 million

System Improvement Program (SIP) $68 million

Together, these programs will accomplish the complete renewal and/or replacement of MUNI's fixed plant and rolling stock. The largest of these improvements will be the MUNI Metro System with its new Light-Rail Vehicles running both at surface and in a new subway. The MUNI Metro System marks a renaissance of the street railway

system in the United States. MUNI Metro and similar systems in Boston and Toronto are the precursors of many regenerated and new subway/surface light-rail systems. They have the potential for high capacity and moderate speeds at a lower cost than heavy rail transit such as BART, and they can be operated either at grade or on exclusive rights-of-way.

MUNI's service objective is to provide convenient, safe and economical public transportation service to the 667,000 residents of San Francisco. MUNI also provides an interface to the estimated 187,000 commuters and other travelers who arrive in the city from the surrounding communities by BART, A.C. Transit, Southern Pacific, and Greyhound.

In terms of MUNI's scheduled route mileage, 72 percent of the mileage is provided primarily on radial routes, 10 percent on feeder routes and 18 percent on crosstown routes. Radial routes connect the downtown business district with all outlying areas; feeder routes are short routes in outlying areas that connect to radial and crosstown routes; and crosstown routes are major routes throughout the City that begin and end in outlying areas. Figure 2.1 shows the extent of MUNI route service throughout the City.

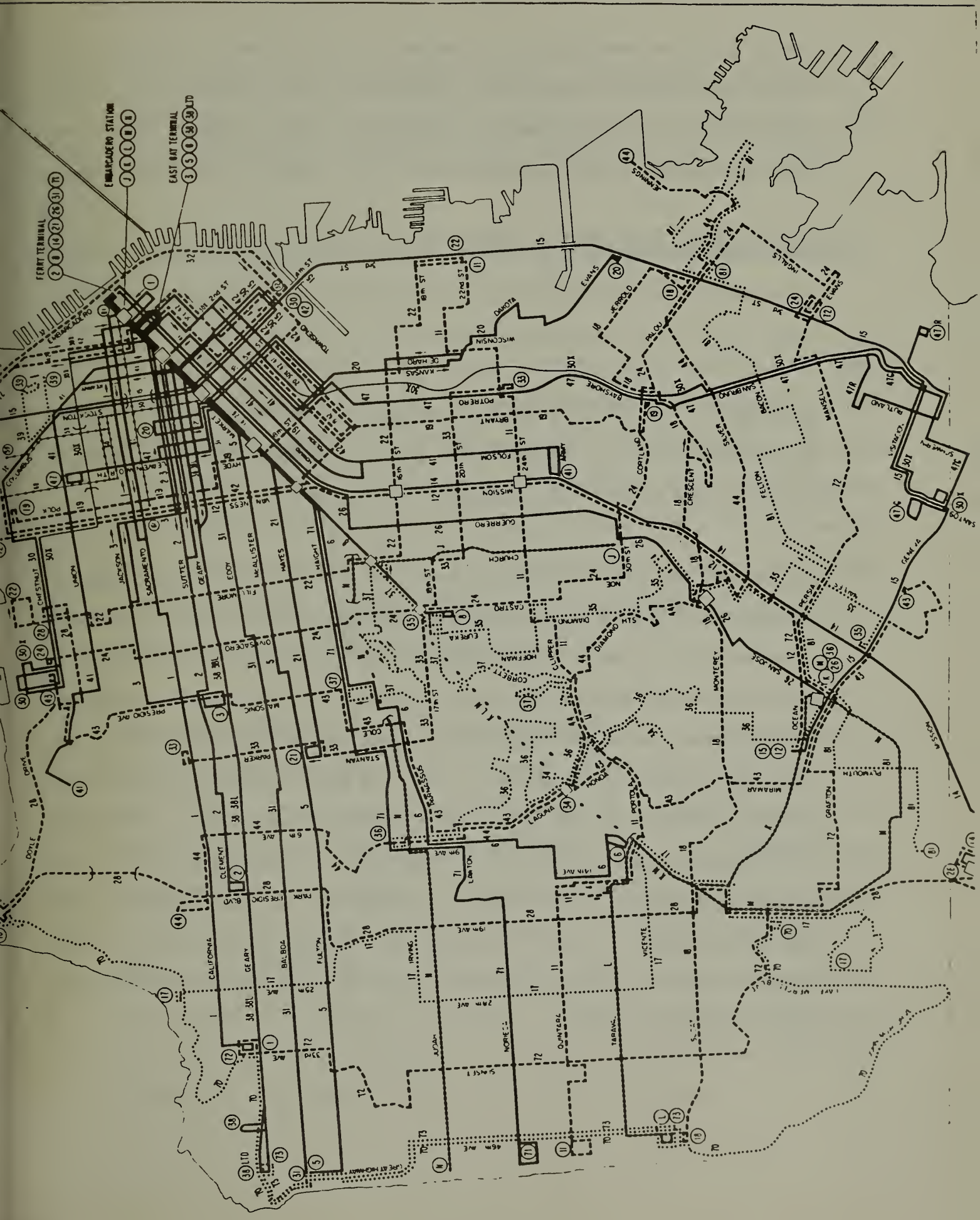
MUNI presently operates three basic types of service. These are:

Local - a route which stops at every Bus Stop.

Express - a route on which buses operate non-stop along a section of its route.

Limited - a route on which buses have limited stops, generally stopping only at transfer points along the middle portion of the route.

FIGURE 2.1 Extensiveness of MUNI Route System 1979 Plan


FERRY TERMINAL
EMBARCADERO STATION
EAST BAY TERMINAL
EMBARCADERO
MARKET
STEUART
BEALE
MAIN
FRONT
DAVIS
SANSOME
BATTERY
FRANKLIN
GOUGH
FILLMORE
WEBSTER
STEINER
PIERCE
DIVISADERO
SCOTT
BRODERICK
DEVISADERO
CHESTNUT
LOMBARD
UNION
JACKSON
SACRAMENTO
SUTTER
GEARY
EDDY
ELLIS
O'FARRELL
MCALLISTER
HAYES
FULTON
GROVE
HAYES
WALLER
HAIGHT
PARNASSUS
PRESIDIO AVE
PRESIDIO
MASONIC
PARKER
STANYAN
COLE
CLEMENT
BLVD
FOREST
FREE
CALIFORNIA
GEARY
BALBOA
FULTON
DOYLE
DRIVE
LINCOLN
FOREST HILL
ST. FRANCIS
WOODSIDE
CORBETT
CASTRO
DIAMOND
DIAMOND HTS
CLIPPER
HOFFMAN
ELPHA
CHURCH
CUERRERO
MISSION
POTRERO
BRYANT
FOLSOM
HARRISON
TOWNSEND
KANSAS
DE HARO
WISCONSIN
DAKOTA
EVANS
KIRKWOOD
PALOU
BAYSHORE
SANTOS
CORTLAND
CRESCENT
SANTA FE
MANSELL
FELTON
PLYMOUTH
GRAFTON
MIRAMAR
OCEAN
MONTEREY
SAN JOSE
DELANO
PLYMOUTH
GENEVA
SANTOS
LAGUNA
HONDA
PORTOLA
LAKE MERCED
LAKE
LAKE MERCED
19th AVE
20th AVE
46th AVE
IRVING
JUDAH
NORIEGA
QUINTARA
TARAVAL
VICENTE
SUNSET
SLOAT
CABRILLO
CABRILLO HIGHWAY
PACIFIC HIGHWAY
ALMADEN
BRIDGE
BAYSHORE
BAYSHORE
BAYSHOR

The San Francisco Municipal Railway provides a variety of fares. The basic adult fare for local and limited service is 25¢. Adult fare for express service is 30¢. MUNI fare for the Senior Citizen, handicapped and students is 5¢ at all times of the day and night, and transfers are free to all passengers. There is also a free fare for the blind.

MUNI sells a monthly Fast Pass to adults for $11 and a Senior Pass for $2.50. These passes are good for unlimited rides during the given month. There are an average of 45,000 Fast Passes and 10,000 Senior Passes sold each month.

In March, 1975, the San Francisco Board of Supervisors adopted a resolution stating San Francisco's policy was that the elderly and handicapped have the same rights to transit as others and that full accessibility is the city's goal.

Toward that end, MUNI hired consultants, MBT Associates and Tudor Engineer Company, to do a study called Muni Metro Accessibility Study, that was to make recommendations on how to make MUNI's new LRVs accessible. The Muni Metro Study recommended that gap closures be installed on the LRV so that in the subway the gap between the car and the platform is closed and that a lift be installed in the front doors to allow access at street level. The Public Utilities Commission also created a Board of Control to oversee a MUNI planning project to study the transportation needs of the elderly and handicapped. The study which you are now reading is the result of that project. Its purpose is to recommend the most appropriate manner to carry out MUNI's total accessibility policy and to make recommendations on service improvement to best serve the elderly and handicapped population of San Francisco.

Twenty-five New Advance Designed Buses were contracted for by MUNI in August 1978; these new buses will be equipped with wheelchair lifts. These new buses along with a retrofit program will begin to implement MUNI policy of total accessibility.

II. Other Organizations Serving the Elderly and Handicapped Transportation Needs

A. Survey

This Project undertook a survey of existing paratransit providers. The names of the organization contacted for this survey were taken from several different sources. These include the "Social Service Agency Survey for the Nine-County San Francisco Bay Area" by the Metropolitan Transportation Commission, "Resource Directory of San Francisco Programs & Services by and for Persons Who are Disabled" by the Developmental Disabilities Council of San Francisco Inc., and the list provided by the San Francisco Commission On Aging. Other organizations were contacted as a result of referral from the above organizations.

The survey respondents answered questions pertaining to the scope and type of service being provided and the number of elderly and handicapped being served. The survey form is shown on the next page as Figure 2.2. The organizations were sent the survey by mail and then they filled it out and returned it to us. The respondents were called and their answers checked. Three factors became apparent as part of this process. The first was the difficulty encountered in attempting to contact many of these organizations by telephone. Two or three calls back were often needed to locate the person responsible for the service. This was particularly true of some of the smaller non-profit organizations. It might be assumed that elderly and handicapped people seeking service were having the same problems.

FIGURE 2.2

MUNI SURVEY FORM

Organization _____
Address _____
Contact Person _____
Phone Number _____
Type of Organization _____

1) Does your agency provide transportation Yes___ No___
2) Does your agency own its own vehicles Yes___ No___
3) Number of vehicles owned _____
4) Vehicles equipped for wheelchairs _____
5) Number vehicles equipped for wheelchairs ____
6) Geographic area of service _____
_____
7) Days of service _____ 8) Hours of service ____

Type of Service

9) Regular routes _____
10) Demand responsive _____
11) 24 to 48 hour advance required _____
12) Longer notice than 48 hours required _____
13) Door to door _____
14) Escort assistance available _____
15) Eligibility for service _____
_____
16) Service limitations _____
_____
17) Transporting to:

Clinic or therapy site	_____	Grocery shopping	_____
Doctor or Dentist office	____	Other types shopping	_____
Hospital	_____	Social events	_____
School	_____	Meetings	_____
Work	_____	Restaurants on meal sites	____

18) Groups accommodated _____
19) Outreach or publicity (type) _____
20) Number of passengers per day (1-way trips)_____
21) Percentage of elderly passengers _____
Elderly defined as: 55___ 60___ 65___ other____
22) Percentage of handicapped _____ %ambulatory___ %non-ambulatory ___
23) Percent fixed income passengers _____
24) Volunteer drivers Yes___ No____
25) Paid driver Yes___ No____
26) Does your agency charge fares to passengers Yes_____ No_____
27) Do any outside agencies subsidize fare other than your agency Yes___ No___
28) Cost per passenger trip _____
29) Other source of income _____
30) Is service fully utilized Yes____ No____

The second factor was that in some instances, the organizations were unwilling or unable to report the estimates of trips being made or people being served. The third factor was that none of the organizations currently maintain exact data on all the questions that required numerical replies. Many of these replies are estimates only and should be viewed in that light. This constraint is amplified by the problem of defining such terms as "handicapped passengers" and "cost per passenger". For example, organizations used different age criteria to determine who was elderly and therefore eligible for their service. The result is a lack of uniformity in the way some numbers were computed by the responding organizations.

B. Interpretation of Survey Results

Survey forms were sent to 250 organizations or agencies in San Francisco requesting information on provision of transportation for elderly and handicapped people. Eighty-four organizations responded with twenty-five indicating that they provide some level of transportation service and fifty-nine indicating no transportation.

Although there are some gaps in the information supplied by the organizations, the survey results give a good indication of the state of paratransit available especially for the elderly and handicapped population. The type and amount of transportation provided by the respondents varies greatly and includes payment of taxi fares, use of ordinary autos and station wagons, 12 or 16 passenger vans with or without wheelchair lifts, and private for profit transportation companies with fleets of vehicles. Only six organizations own vehicles specifically equipped for wheelchairs although more actually transport wheelchair users without any special equipment. Some organizations/agencies exist primarily as transportation suppliers, though most offer transportation only as an adjunct to other institutional functions.

The level of service provided by these operations varies considerably. Most do not charge fees for transportation although private "wheelchair taxi services" charge more than $20.00 per trip. These fees are usually paid for by agencies rather than by users. The reported cost of providing the trips varies greatly, averaging about $2.40 per passenger trip for the agencies, and $20.00 for the private wheelchair taxi.

Reported hours of service also varied:

-- 3 agencies ran for 1 to 2 hours in the morning and again in the afternoon.

-- 3 agencies ran for 12 to 14 hours, typically 8 AM to 10 PM.

-- 3 agencies including the private wheelchair taxi offered 24 hour service.

-- The balance offered 6 to 10 hours of service, typically 8:30 AM to 4:30 PM.

The organizations can be categorized by size according to the number of passenger trips per day that they provide:

TABLE 2.1

Trans. Supplier	Each Agency Makes — Trips/Day	No. of Agencies	Total Trips Per Day By Group	Percentage
Group A	150-550	6	1770	90%
Group B	20-50	4	100	5%
Group C	10-19	4	50	2.6%
Group D	1-9	7	40	2%
Group E	don't know	4	?	--
Total	--	25	1960	100%

Of the 6 Agencies comprising group A that provide the most trips: 2 are private for profit companies, one is an ambulance-type service with high costs used mostly for medical trips, and the other is a school bus company that transports handicapped students to and from school.

-- 1 is a handicapped recreation center that provides trips to and from the center.
-- 1 is a senior center that provides trips for medical/health visits.
-- 1 is a transportation project for the elderly and handicapped that is used mostly for medical/health trips though it was intended for other purposes as well. Medical trips are given first priority, and the agency states that it can handle few additional trips.

The 6 Agencies of group A provide a total of 1,770 trips/day, about 90% of the total trips/day.

-- 3 of the agencies offer services almost exclusively to and from the agency program.
-- 3 offer service for the most part only for medical/health trips, because of limited supply or high cost to passengers.

Virtually none of the trips provided by these 6 large agencies or the smaller ones are on-demand trips made for whatever purpose the traveller desires. Trips for non-medical or non-institutional purposes such as socialization or recreation are limited to group outings or certain designated facilities, and there is virtually no paratransit service for employment or college education. This condition indicates that demand is far greater than supply and that the agencies offering the transportation usually provide trips only for specific agency functions.

Four Agencies provide 20-50 trips/day (Group B).

-- All four serve only clients.
-- 2 provide trips only for medical or school purposes.
-- 2 provide trips for a variety of purposes (a school for the deaf and a senior center). However, these trips are usually prearranged group trips.
-- Again, virtually none of the trips provided by these four agencies (Group B) are on-demand trips for whatever reason the traveller wishes.
-- Group B provides about 100 trips/day or 5% of the total.

The remaining agencies in groups C, D, and E together account for only about 5% of the total trips.

1. Trip purpose

The survey results can also be broken down according to trip purpose, giving a more complete picture of the special transportation available to the elderly and handicapped. The transportation agencies were divided into four trip purpose categories: medical/health trips, school and program trips, social/recreational trips, and multipurpose trips as shown in Table 2.2.

The Medical-Health category is the largest trip purpose category. These agencies make entirely or most medical related trips because these trips are regarded as something that absolutely has to be done or because the agencies offering the transportation are health-related and make trips as a subordinate function to their main program. Many of the agencies in this category make trips for a variety of other purposes, but their predominant function is to provide medical/health related trips. These agencies report making about 765 trips/day, 40% of the total.

The next largest trip purpose category is school and program trips. The 5 agencies in this category include a private bus company that has a contract, with the San Francisco Unified School District, a school for the deaf, a school for the mentally retarded, a center for the physically handicapped, and a center for the visually handicapped. All the people who receive transportation service from these five organizations are either students at the schools or enrolled program members of the centers. These schools are equivalent to primary or secondary schools; we are aware of no special transportation for transportation handicapped wishing to attend college. These agencies provide 651 trips/day, 33% of all trips.

TRIP PURPOSES
TABLE 2.2

		NUMBER OF AGENCIES	NUMBER OF TRIPS/DAY
1.	MEDICAL OR THERAPY		
	a. All or almost ALL MEDICAL	8	544
	b. Mostly MEDICAL (Some other purposes)	4	166 +
	c. MEDICAL or INSTITUTIONAL (School or welfare office)	3	55
		15	765 +
2.	SCHOOL AND PROGRAM	5	651 +
3.	SOCIAL RECREATIONAL	2	512 +
4.	MULTI PURPOSE	3	28 +
	TOTALS	25	1956

Two agencies provide trips primarily for social and recreational purposes. They include a recreation center for the handicapped and a YMCA. The former provides trips to and from the recreation center for elderly and handicapped individuals. Users of the services must be clients or members of the program. The YMCA offers trips for groups of seniors and must be booked well in advance of the trip. The recreation center reports that it makes 512 passenger trips/day, and the YMCA has not determined a number.

There are three agencies that provide trips for several purposes, including a senior center for Japanese, a mental health center, and an adult vocational program. Most of this service is in the form of arranged outings for program participants. This group provides at least 28 trips/day on average plus an additional unreported amount or 1.5% of all trips. The various trip purposes include medical, shopping, social events, meetings, and restaurants.

TABLE 2.3

TRIPS BY PURPOSE AND PASSENGER TYPE

	MEDICAL			SCHOOL & INSTITUTIONAL			SOCIAL RECREATIONAL			MULTI-PURPOSE			TOTALS		
CLIENTS ONLY?	36%			100%			100%			100%					
HANDICAPPED or ELDERLY	E	H	E&H	E	H	E&H	E	H	E&H	E	H	E&H	E	H	E&H
# Agencies	4	10	1		5		1	1		1	2		6	18	1
% Agencies	27%	67%	7%		100%		50%	50%		33%	67%		24%	72%	4%
# Trips	344	121+	300		651+		?	512		20	8+		364+	1292+	*300+
% Trips	45%	16%	39%		100%		?	?		?	?		19%	66%	*15%

*These 300 trips are provided almost exclusively to elderly though the agency will serve handicapped as well.

III. Summary of Existing Operations

Transportation as a special service to the elderly and handicapped has grown because of the inability of the regular transportation system to accommodate these people. Many elderly and handicapped people are physically unable to operate automobiles or ride public transit, and most cannot afford autos or taxis. As a result, social service agencies have found it necessary to provide some sort of specialized transportation so that people eligible for their social service programs are able to participate. Hence, the development of E & H transportation follows according to a predictable course.

A new sense of awareness, new social services, and a feeling that the individual has a right to mobility work together to create a demand for transportation. But the transportation handicapped cannot go into the marketplace and purchase the transportation they demand so they attempt to "purchase" it politically by organizing and pressuring governmental agencies into supplying the needed transportation.

Examination of the survey results shows that paratransit is in a rudimentary form. This is evident from 1) the nature of the agencies providing transportation, 2) those receiving the transportation services, and 3) the purposes for which the trips are made.

Concerning the nature of agencies, it is clear that E & H paratransit is usually supplied by agencies for which transportation is a secondary interest. 76% (19/25) of the transportation suppliers provide about 10% of the reported trips per day. The agencies themselves work from a base of limited resources, and the resources for the transportation programs are even more limited. The secondary status of

transportation means that it gets less attention from the agency management. This is compounded by the funding structure for E & H paratransit which usually involves a 80% grant for purchase of vehicles but lesser amounts or nothing for operational costs. It is much easier to obtain a grant to purchase vehicles than to operate a successful paratransit system for elderly and handicapped.

Additional evidence that paratransit is operating at a minimal level is found by considering who uses the service. The great majority of passengers are clients or enrollees of the social service agencies offering the paratransit. Agencies that transport people who aren't members of their program often insist on a referral from a doctor or medical facility in order to be eligible for the service. It is reasonable to expect that an ideal transportation system for the elderly and handicapped that is low or no cost and publicly supported will determine eligibility through the criteria of age and disability; however, prior membership or enrollment in particular programs should not be required. The current existence of this requirement in most cases illustrates the pressing need for expansion of transportation for the elderly and handicapped.

This need for transportation expansion is also evident from the trip purpose data. The high percentage of medical and health related trips in no way should imply that these are the only trips that elderly and handicapped people want to make. It is a common but misleading fallacy that the elderly and handicapped are generally ill and always rushing about to doctors' offices and hospitals. The elderly and handicapped want to have the same freedom of mobility and to make the same kinds of trips as younger and non-handicapped people. It is nearly impossible for low income transportation-handicapped people to travel according to their immediate desires in the same manner as other people using cars, taking the MUNI, or calling a taxi. Most important, their opportunities for employment or higher education are severely limited by this lack of transportation.

Although the MUNI system provides a high level of service to the general population, none of the physical barriers that make its use difficult or impossible for the elderly and handicapped have been removed. Many people who want to ride MUNI are denied use and must depend on very limited paratransit services or their friends and relatives for transportation.

Expansion of E & H transportation would mean much more freedom of mobility for the elderly and handicapped. This expansion could eventually involve efforts in several directions: the quantity of E & H paratransit could be enlarged if the various providers obtain more vehicles and drivers and directly supply more trips. Centralized coordination of the many paratransit operations could increase the efficiency of existing and proposed service.

Finally, an accessible MUNI could increase the freedom of mobility for the transportation-handicapped by orders of magnitude. Even the current level of paratransit in San Francisco costs millions to fund, and the amount necessary to offer such a huge population group a complete demand activated paratansit for all trips would be prohibitive. San Francisco's MUNI is already such an extensive system that access to it would provide the transportation handicapped with a level of mobility not obtainable through foreseeable provision of paratransit.

CHAPTER 3

ALTERNATIVE TRANSPORTATION MODES

At this time, there is a sizable market of persons whose mobility needs are unmet. If these needs are to be met, it is clear that either service modification or new service structure will be necessary. This section presents two basic system concepts -- demand-responsive service and fixed-route service -- as alternative means of improving mobility for transportation handicapped persons.

There are other transportation concepts that have been considered by this Project but not included in this report because they were felt to be inappropriate. For example, advanced design wheelchairs are relatively unsafe as street vehicles in motorized traffic, and their use is limited by weather conditions. Subsidized ownership of accessible private automobiles still excludes many disabled people who can't drive, especially those with visual disabilities.

I. Demand-Responsive Service

Demand-responsive service is designed to provide transportation in response to specific trip requirements as need arises. Vehicles are assigned on a trip-by-trip basis without the limitations of fixed route and time schedules. Demand responsive service is similar to conventional taxi service except that individual trips may be combined through a central dispatching function to reduce unit passenger costs. The closest analogy is to a shared or group taxi operation.

Demand-responsive service is based on the consumer actuating the system by placing a call to the dispatching center indicating present origin, desired destination and the number of persons in the party. The controller then determines which vehicle is in the best position to accommodate the request. The dispatcher then adjusts the schedule of the selected vehicle by informing the vehicle operator of the request and the route that should be utilized. Finally, the dispatcher notifies the user of the vehicle's estimated arrival time and the fare for the service.

Those requesting service are currently required to make their travel plans in advance. This pre-arranged service environment promotes efficiency in scheduling, and also results in an increase in system productivity through the aggregation of travel demand. A number of other systems, including those operating in Portland, Minneapolis-St. Paul, Denver, Buffalo, and Sacramento provide specially-designed demand-responsive or subscription services limited to handicapped users.

Demand-responsive service may be provided using one of three alternative concepts for operation. These are described below.

A. **Municipal Railway Operated, Area-wide Service** - Under this concept, MUNI would provide demand-responsive service (purchase the necessary small vehicles, provide drivers, dispatching capability and all costs of maintenance and operation). Direct origin-to-destination service would be provided for all trips with no requirement for transferring in the City and County of San Francisco. Area-wide service is particularly applicable to San Francisco because of its relatively small (48 square miles) size.

B. Subsidized Taxi - Subsidized service would call for a taxi providing the requested trip. A fare would be paid to the driver, by the patron, while the cost of the remainder of the actual trip would be paid for in the form of subsidy from MUNI. This approach would place the service on an existing paratransit provider, minimizing MUNI responsibility regarding service. Rather than provide the actual service, MUNI would subsidize taxi service to meet the handicapped demand for service. A thorough examination of this alternative results in several unforeseen complications. They will be discussed further ahead in this report.

C. Contract Service - This demand-responsive approach calls for seeking a provider by contracting with an outside organization to provide service. If federal funds are provided, MUNI would purchase the vehicles and turn them over to the organization selected to operate the service. MUNI would be responsible for monitoring service and assuring service effectiveness. The selected provider would be responsible for the service, hiring the drivers, maintenance and operation of the service, reimbursed as specified in the contract at an agreeable amount of money per vehicle service hour.

II. Fixed-Route Service

Comprising the majority of bus service offered by transit agencies, fixed-route service involves the operation of vehicles along a regularly established route or routes in accordance with predetermined and publicized schedules. The ridership market for this type of service is generally found among travelers with similar origins and destinations whose travel plans can be adopted to scheduled times of service.

Fixed-route services with lift-equipped buses have been advocated as a means of providing mobility for the handicapped because it enables those with transportation-related disabilities to re-enter the mainstream of American life. Transit agencies in San Mateo County, Philadelphia, Baltimore, New York, Seattle, Santa Clara, Los Angeles County, San Diego and Houston are among some of systems which are presently operating or planning to operate accessible buses along regularly-established transit routes.

Following are several fixed-route service alternatives. Integral to all these alternatives is the lift equipped option for regular fixed route service.

A. Partial Accessibility - Lift equipped accessible buses would operate on all routes at specified intervals only, such as every other or every third trip. Providing partial fleet accessibility could most likely be accomplished by equipping only new vehicle purchases with hydraulic lifts and tie-downs until 50% of the bus fleet was fully accessible.

Additionally, it is possible that as the proportion of the fleet equipped with accessibility features increased over time, the frequency of service offered to the transportation handicapped would be improved commensurately until, eventually, the entire system would become fully accessible. Communities operating, or planning to implement this alternative include Philadelphia, New York, Los Angeles, Seattle, and San Diego.

B. Specified-Route Accessibility - This alternative would designate specific routes as fully accessible. These routes could be either existing MUNI routes, new routes designed to serve identified transportation handicapped needs, or a

combination of both existing routes and new routes. The basis of this alternative is the identified need to support specific routes as fully accessible. In order to identify service deficiencies and demonstrate specific service needs, extensive study would be necessary to determine if there are high numbers of origins and concentrated destinations that could be served with the implementation of specific accessible routes. Indications are that there are no concentrations of handicapped in specific areas of San Francisco.

C. Full Accessibility - This type of service would consist of equipping all buses operating on fixed routes with accessibility features for handicapped persons. Thus, the entire fleet of standard buses operated by a MUNI would be accessible, equipped with lifts and tie-downs for those persons who use wheelchairs. Such a system would be implemented by both retrofitting all existing coaches with an accessibility package, and by specifying that all new coaches be so equipped by the manufacturer.

If full accessibility to the MUNI system were implemented, MUNI would have a new group of patrons to service and plan for. This could result in route and schedule changes specifically for the transportation-handicapped, using normal MUNI/PUC procedures for service changes. These hypothetical new routes would be operated as regular MUNI routes.

CHAPTER 4

CRITERIA

In order to evaluate the alternatives, criteria must be developed. These criteria should measure the alternative with respect to meeting the mobility needs of the handicapped, the level of service, the interface between each alternative and the operational or societal concerns, and the financial resources required to institute and operate the system. The aim of the criteria is to distinguish and determine which alternative (demand-responsive or fixed-route accessibility) will best meet the needs of the transportation handicapped. The alternatives will also be compared as to their cost.

Listed below are criteria that have been proposed and classified into the following categories:

Equivalency Criteria

- Trip purpose;
- Trip decision time;
- Travel time;
- Transfer frequency;
- Service coverage; and
- Fares.

Institutional Criteria

- Goals and Policies
- Legal consideration; and
- Social integration

Economic Criteria

- System operating costs;
- Capital costs; and
- Patronage potential

A more detailed discussion of each of the criteria is presented below.

I. Equivalency Criteria

Throughout the country transit properties are attempting to develop service programs aimed at meeting the needs of the elderly and handicapped. These service programs generally take the form of two concepts:

- Fixed-route accessibility; and
- Demand-responsive service.

The equivalency test was developed as a means to measure and compare the service levels of these two modes.[1] The specific criteria are aimed at key service aspects of the transit operations. In using these criteria as a comparative tool, it is hoped that differences in each service option are more identifiable and that at a minimum demand-responsive service would be reasonably equivalent (provide the same level of service) to fixed-route full accessibility in meeting the needs of the handicapped.

Further, as partial compliance with Section 504, guidelines promulgated by the Urban Mass Transportation Administration (UMTA) with regard to transportation for the elderly and handicapped are described in the Federal Register of April 30, 1976 (49 CFR Chapter VI 613, 204). One of the alternatives specified is:

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(1) Dennis Cannon, Design Criteria for Transportation for the Disabled: A Test of Equivalence, Southern California Rapid Transit District, 1976.

- Purchase of only wheelchair accessible new fixed route equipment until one-half the fleet is accessible, or, in the alternative, provision of a substitute service that could provide comparable coverage and service levels.

The equivalency test provides a means to measure and determine whether a substitute service (demand-responsive) provides "comparable coverage and service levels". Following is a brief description of each criteria:

Trip Purpose - People use transit to meet their daily needs. Most common is the trip to work or school. Other trip purposes include recreation, visiting, shopping and medical. In a reasonably extensive transit system, the user may choose equally between trips for these various purposes. The comparative analysis of this criteria aims at identifying that each alternative would provide at least the same level of service for trip purpose.

Trip-Decision Time - A demand-responsive system should require no more advanced decision to travel than the average able-bodied person when using fixed-route system. In other words, on a fixed-route system with an average 20-minute headway, the user need decide to travel no more than 20 minutes prior to departure.

Travel Time - Travel time for an alternate system should be no greater than the existing travel time for the able bodied using fixed route service.

Transfer Frequency - Common practice in the transit industry is to minimize the need for transferring from one vehicle to another. To the extent possible fixed-route schedules are established to provide service system wide with only one transfer. An alternate system should be designed such that service is provided with the same transfer frequency as is generally found on fixed-route service.

Service Range and Coverage - In an alternate system such as demand-responsive service the range (hours of operation) and service coverage (area served) should be the same as the existing fixed-route service available to all able-bodied passengers.

Fares - Federal regulations call for reduced fares for the elderly and handicapped. Specifically, fares for the elderly and handicapped should be no more than one-half the fare of the regular fixed route service. Consequently, according to the equivalency test, fares then should be no more than one-half the regular fixed-route fare for an alternative service.

II. Institutional Criteria

In the previous section it was noted that the aim of the equivalency criteria is to measure the actual operation of each alternative. In this section the institutional criteria attempt to describe the relationship between the transit operations and the values of society. Criteria addressed include:

- Goals and policies;
- Legal requirements; and
- Social integration.

These criteria are a means of measuring the social and political desires. They specify and identify the service programs considered most desirable by elected and appointed policy bodies, and by the transportation handicapped themselves. It is hoped that the selection of an appropriate alternative reflects to some degree the intent of the above criteria. Following is a discussion of each of the above institutional criteria.

A. Goals and Policies - To assist in guiding the development of programs for the handicapped, federal, state, regional and local government policy bodies have passed resolutions that identified what should be followed by agencies implementing handicapped programs. These policies take the form of resolutions passed by the San Francisco Board of Supervisors,* the Public Utilities Commission of the City and County of San Francisco and the Metropolitan Transportation Commission (MTC) which is the statutorily created regional transportation planning agency. Following is a discussion of the resolutions approved that are aimed at guiding the development of both the San Francisco Bay Area's and Municipal Railway's elderly and handicapped programs.

The Public Utilities Commission (PUC), the immediate governing body of MUNI, passed Resolution Number 76-0383 in September 1976 stating that "all persons have the right to transportation", that mass transportation on scheduled, fixed routes using regular vehicles "be made accessible to the entire transit dysfunctional handicapped population, including those in wheelchairs" and that "it is inappropriate for a mass transit system to provide specialized services in such forms as door-to-door services".

In addition to the PUC resolution, the Metropolitan Transportation Commission over the past several years has approved several resolutions outlining what should be done to fulfill the service needs of the elderly and handicapped. There are three pertinent resolutions regarding this subject:

*Resolution 219-75; March, 1975.

- Resolution Number 299;
- Resolution Number 467; and
- Resolution Number 468.

Resolution Number 299 - This was the first resolution approved by MTC in December of 1975. The intent of this resolution was to require Bay Region operators to develop and implement programs, in coordination with MTC, and private and non-profit agencies as well, to make transportation service reasonably accessible. In addition, this resolution provided Overall Work Program funds to plan and implement the programs.

Resolution Number 467 - This resolution, approved in August, 1977, required that operators utilizing 200 or more buses should implement about 25 wheelchair accessible standard size coaches on fixed routes and likewise for any specialized services of their system. Also, proposed grants involving the purchase of smaller than standard size coaches and regular coaches not equipped for accessibility will not be approved after October 1, 1977 and October 1, 1978, respectively. And finally, by Jan. 1, 1987 all fixed route service should be fully accessible at the base service frequency.

Resolution Number 468 - A final resolution, also passed in August, 1977, resolves that MTC should not endorse a federal or state transportation grant request by private, non-profit, or paratransit operators, including claimants under Urban Mass Transportation Administration Section 16(b) (2), unless the claimant shows to the satisfaction of MTC evidence of willingness to participate in a county-wide paratransit coordinating council.

These resolutions clearly identify what programs MUNI should be considering. Their intent is to require MUNI to develop a program eventually resulting in fixed-route peak service that would be 50% accessible (full accessibility during off peak hours).

Also, MTC through these resolutions, is requiring coordination of paratransit services not only among themselves, but also, between themselves and the fixed-route service providers.

B. Legal Considerations - UMTA guidelines with regard to transportation for the elderly and handicapped were initially described in the Federal Register of April 30, 1976 (49 CFR Chapter VI 613, 204). Alternatives specified in this document are the following:

- A program for wheelchair users and semi-ambulatory handicapped that will involve the expenditure of an average dollar amount equivalent to a minimum of five percent of the Section 5 apportionment to the region. Funds may, however, be derived from sources other than Section 5.

- Purchase of only wheelchair-accessible new fixed-route equipment until one-half of the fleet is accessible, or, in the alternative, provision of a substitute service that could provide comparable coverage and service levels.

- A system of any design, that would assure 10 round trips per week, if requested, for every wheelchair user or semi-ambulatory person in the sub-region at fares comparable to those on standard transit buses for trips of similar length within the service area.

- Coordination of transportation for the handicapped and associated funding of the various transportation operators, government, health, and welfare agencies and private non-profit corporations.

On May 19, 1977, Secretary of Transportation Brock Adams mandated that all local transit authorities seeking federal assistance for the purchase of standard size mass transit buses must use "Transbus" specifications after September 30, 1979.[1] Transbus specifications include the following elements which, together are designed to improve accessibility for the elderly and handicapped:

- A stationary floor height of not more than 22 inches;
- An effective floor height including a kneeling feature of not more than 18 inches; and
- A ramp for entering and exiting by wheelchair users.

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(1) "Decision of Brock Adams, Secretary of Transportation, to Mandate Transbus," May 19, 1977, p. 11.

While the Transbuses will probably not be available for revenue service until 1981, the Secretary also indicated that in the interim, local transit authorities must either purchase buses with lifts or provide specialized service. In addition, Secretary Adams stated:

> "Those who purchase lift-equipped buses will thereby offer substantially enhanced accessibility to their elderly and handicapped citizens. Those offering special services will provide valuable experience for the period after Transbus is introduced, since even fully accessible fixed-route buses will not meet the transportation needs of all elderly and handicapped."

Despite the Transbus decision and the transit industry's efforts to provide better service for the elderly and handicapped, these efforts may be considered inadequate or insufficient according to Section 504 of the Rehabilitation Act of 1973. This section prohibits discrimination against handicapped persons stating:

> "no otherwise qualified handicapped individual in the United States, as defined in Section 7(6), shall solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

In May, 1978, Secretary of Transportation Brock Adams proposed UMTA guidelines to meet the requirements of Section 504 of the Rehabilitation Act of 1973. They are known as the 504 Regulations Notice of Proposed Rulemaking (504NPRM). This rulemaking reaffirms the Transbus mandate and calls for "program accessibility" (50% of fleet within a specified time period) for all mass transit systems receiving federal

aid. This level of accessibility can be achieved either through purchase of new accessible vehicles or retrofitting of existing vehicles. Public hearings are taking place during the Fall of 1978 before the 504 NPRM becomes permanent law.

A final legal criterion has been identified regarding Section 4500 of the Annotated California Government Codes. This Section requires "that all rapid transit equipment and structures shall be so built that handicapped persons shall have ready access to, from, and in such equipment and structures; provided, however, that contracts for equipment and structures incidental to the operation of an urban transit system shall be available from not less than two manufacturers.

C. **Social Integration** - The term "social integration" is considered as having two somewhat different meanings. One concerns the ability of the transportation handicapped to utilize the same transportation services as society in general. The other meaning concerns itself with the ability of the transportation handicapped to take part in the same activities as other persons once the trip is completed.

The reasoning supporting the first meaning is as follows: the main thrust of the civil rights movement of disabled people has been toward independence. They wish to live their lives as do the able-bodied, without having to depend on constant attention from other people or groups for their needs or wants. Independence means being able to use and adapt to the same institutions that everyone else uses; for the disabled are justifiably concerned that if parallel institutions are set up only to serve them, they will be permanently established as a subsidiary and secondary class. When the disabled can use the same institutions as everyone else, there will be less chance that

their independence can be taken away due to financial or political circumstances. Moreover, society will come to accept their presence and participation in all aspects of life and will become aware of the valuable contributions that they can make.

For these reasons, the disabled desire to use the same transportation system that everyone else uses. They believe that they have the right to; and Congress has recognized that right in the passage of the Rehabilitation Act of 1973.

Use of public transportation could expose disabled people to some risks not found on special paratransit for the elderly and handicapped. Assaults and robberies do occur on transit vehicles. However, disabled people feel that the answer to this is not to segregate them onto their own system, but to make public transportation safe for <u>everyone</u>. They also feel that a system which they can use would be easier for everybody to use including small children, people carrying bundles, people travelling with children or infants, etc.

Some disabled people may have trouble reaching transit stops, but they view this as a transit system problem that affects everyone, not as an accessibility issue. Planning studies show that transit use declines directly with distance from stops for <u>all</u> people. In the long run, full accessibility should strengthen the transit mode in relation to other modes of travel by making it easier and more attractive to the entire society.

On the other hand, an integrated transit system that cannot be reached by at least some, if not all the handicapped, because access or egress distances are too great or scheduling is too infrequent, does little to promote the cause of true social integration. Consequently transportation that would permit the disabled to use the same transit facilities as the overall public might not necessarily provide meaningful social integration.

Therefore, we are including both of the meanings in our criterion of social integration:

1. Accessibility to the same transportation system used by the general public; and

2. Such a system provides service within a reasonable distance of facilities used by the general public.

III. Economic Criteria

A final group of criteria considers economic impacts of each alternative, if implemented. These economic criteria include;

- System Operating Costs;
- System Capital Costs; and
- Potential Revenue/Patronage.

Each of these criteria are described below.

A. System Operating Costs - System operating costs consist of vehicle operation and maintenance costs, drivers' wages, dispatching, information, and organizational costs. These operating costs are then combined to represent the system cost on a yearly basis.

The key to this estimation procedure is to determine the anticipated level of service. To do this we determined that all the alternatives would operate at a level of comparable coverage and service.

For a Demand-Responsive System, this would require a 1 to 6 ratio or 1 special vehicle to 6 transit coaches.[1] This ratio is based on special vehicle seat space versus full size bus seat space. It also assumes that handicapped persons will use special vehicle service in the same proportion as the general population uses mass transit.

However, the handicapped population makes a greater proportion of their trips on transit than does the general population. This would indicate that more than 167 special vehicles would be needed. On the other hand, the handicapped population makes less trips per person than the general population. Even if a fully accessible paratransit system were available, the handicapped population as a whole might not make as many trips as the able bodied.

In other words, some data imply that a greater number of paratransit vehicles would be needed to achieve comparable service capacity, and some data imply that a lesser number would be needed. Therefore, it seems reasonable to use the figure derived from the UMTA/Caltrans guidelines.

Demand-responsive vehicles in other cities have made a maximum of about 50 one-way passenger trips per day/per vehicle. Existing services in San Francisco average about 30 one-way trips/day/vehicle. Using an average of 40 trips/day, 167 vehicles would provide a total of 167x40=6680 one-way trips/day x 30 days = 200,400 one-way trips/month. Skipping ahead to Table 5.11, there is a potential for 181,600 additional trips/month if MUNI were made fully accessible or 178,000 additional trips/month for a demand-responsive service.

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(1) U.S. Department of Transportation, Economic Impact Analysis, of the Proposed Rulemaking of Section 504 of the Rehabilitation Act 1973, June 6, 1978.

Therefore, an estimate of 167 demand-responsive vehicles providing about 200,000 trips/month (30 operating days) would be a reasonable number to adequately handle the potential demand. This allows for any unforeseen increase in demand as well as loss of vehicles from service due to maintenance and repair requirements.

For fixed route service, it would be necessary to identify any incremental costs. The incremental costs are associated with the possible increase in vehicle running times, potential need for additional vehicles, and the associated system operating costs. Although there is some question as to whether a slowing of schedules would result from making public transit accessible, there is no definite proof that this would happen.

B. Capital Costs - The capital expenditure that would accompany the institution of each of the transportation alternatives is derived from the operational characteristics postulated for each of the alternative plans. Capital costs include any additional equipment, and the possibility of retrofitting the existing fleet with lifts. It also includes any additional equipment required to maintain the existing conventional system should it be adversely impacted by the implementation of service for the transportation handicapped.

C. Patronage Potential - The ultimate success of any public transportation system may be gauged by its anticipated level of ridership. Estimating ridership increases from the transportation-handicapped population is difficult because transportation systems for this group do not exist beyond the most rudimentary stages. Elderly and handicapped paratransit systems are so small that their levels of ridership are totally controlled from the supply side. Mass transit systems that have achieved total or partial accessibility are not similar to MUNI's situation in San Francisco.

These patronage potential estimates are based on data from Grey Advertising, Inc.'s Summary Report of Data from National Survey of Transportation Handicapped People, prepared for DOT-UMTA in June, 1978. This work is the first part of a major effort to assess the entire situation of transportation for the transportation-handicapped. It is the first national study using probability and sampling techniques to measure the size and characteristics of the transportation-handicapped population.

According to the National Survey, the average number of trips made by each handicapped person is 28.6 per month. This corresponds to 54.8 trips per month made by the able-bodied. This difference is due primarily to fewer taking work trips. The transportation-handicapped who do work make about as many work trips as the able-bodied. It is not clear how much of this gap will be closed when transportation is readily available to the transportation-handicapped.

CHAPTER 5

ANALYSIS OF ALTERNATIVES

The application of the criteria utilized in this study is intended to allow meaningful comparisons between the different transportation systems that could serve the elderly and handicapped community. The criteria can be used as yardsticks to measure the transportation alternatives and to indicate the more important differences between them. As stated above, three types of criteria will be used to measure the alternatives: equivalency criteria, institutional criteria, and economic criteria.

I. Equivalency Criteria

The information in the following section is summarized in Table 5.1 which follows this section.

A. Trip Purpose

1. Demand Responsive Services.

In the section on alternative transportation concepts, three ways of providing a demand responsive transportation service (paratransit) for the elderly and handicapped are described. There are no inherent differences between them in regard to trip purpose. However, demand responsive service as a whole can be quite different from fixed route full accessibility in providing trips for all purposes.

The important variable for demand responsive service in meeting the equivalency test is the amount of service provided, in other words the size of the demand responsive service in relation to the demand for trips. At an ideal level, paratransit operates similarly to a taxi-service with the consumer determining where and when he wants to travel and the service accommodating those desires. In reality the level of service provided by urban paratransit cannot begin to meet the demand for transportation from the elderly and handicapped community.

A private taxi company can follow the classical method of using price to equate supply and demand, thereby still serving all trip purposes of those who can afford to pay. Paratransit, which is intended to serve low income people, cannot charge high prices and must look at other methods to meet demand. Trips are prioritized by purpose, and medical trips usually have the highest priority. Some trip purposes such as social visits and personal business cannot be served at all.

When a more extreme imbalance exists between supply and demand, paratransit systems may have to cease taking calls from individuals even for medical trips. They evolve into subscription services whose time is booked up in advance by various social service agencies dealing with the elderly and handicapped. The user of the paratransit system has even less choice in trip purpose and must accommodate himself to the social service programs in which he is enrolled.

Though a demand responsive service may theoretically meet the equivalency test for trip purpose, in reality it is unlikely to do so. Paratransit fleet size could be set at some number that would allow equivalency with regard to trip purpose. But no one knows what size would be needed. It would have to be greater than the 167 vehicle fleet postulated for "comparable" service.

Special Note on Subsidized Taxi Alternative

In this section, all the demand-responsive transportation systems have been grouped together for testing against the equivalency criteria. Subsidized taxi service is different in some respects from the other demand-responsive systems: trip decision time should be less than for other paratransit systems, generally meeting the equivalency test. Travel time should be less, and there would be no need for transfers. Hours of operation would be the same as regular taxi-service, usually 24 hours. Fares, even when subsidized, would be greater than regular transit fares because of the high initial cost charged by taxis.

In many respects, this alternative seems to provide a higher level-of-service than other paratransit systems. However, taxis are inaccessible to many disabled people, especially but not exclusively those in electric wheelchairs. For this and other reasons, particularly high cost to users, subsidized taxi service would not be an acceptable solution to the transportation problems of the elderly and handicapped community.

2. Fixed Route Full Accessibility.

As the MUNI system now operates, it is an extensive system that allows users to travel to almost any destination in San Francisco and to change to other transit systems serving the East Bay, North Bay, and Peninsula. Greater frequency of service occurs during the morning and afternoon peak travel periods, and there is a minimal service operating in the late night hours. The user is therefore able to make trips for a variety of purposes including work, school, shopping, recreation, personal business, social visits and so forth.

3. Fixed Route Partial Accessibility.

This type of transit service calls for fully accessible vehicles to operate on all routes at specified intervals, such as every other or every third trip. This system would have the same geographical coverage as the full accessibility system and would be equivalent in regard to trip purpose.

4. Specified Route Accessibility.

Certain routes would be designated as fully accessible. These could be either existing MUNI routes or new routes designed to serve the identified needs of the transportation handicapped. Because not as many locations are served, this system is not equivalent to full accessibility in regard to trip purpose. If there were enough specified routes, trips could be made for the full range of purposes but to a more limited degree than with the previous alternatives.

B. Trip Decision Time

1. Demand Responsive Service

The amount of advance trip decision time for demand responsive service increases greatly as the demand for that service outstrips supply. In order for a call to be answered quickly, empty vehicles must be close enough to pick up added riders and still maintain their general route of travel. Paratransit in San Francisco is orders of magnitude away from fixed route full accessibility in meeting this test of equivalency. In many cases a 48 hour advance trip decision is required. A greatly enlarged paratransit service could significantly reduce trip decision time, perhaps

approaching that of private taxi companies as a limit. This high level of paratransit might call for advanced trip decision time of one to one-and-a-half hours. It is highly improbable that any demand responsive service could be equivalent to an accessible MUNI system in advanced trip decision time. However, trip decision time of one hour or less could be considered acceptable considering the inherent characteristics of demand responsive systems.

2. Fixed Route Full Accessibility

For a fixed route system, advance trip decision time is mostly a function of headway. If the headway on the desired route is 30 minutes and it takes the user 10 minutes to get to the transit stop, the maximum trip decision time is 39 minutes. The headways on the MUNI system are unusually close, ranging from 3½ minutes (off peak!) to 30 minutes (and in one case, 40 minutes) during the day and evening. Though no system-wide average headway has been calculated, one can assume that advanced trip decision time is usually from 5 to 15 minutes exclusive of time necessary to get to the stop.

3. Fixed Route Partial Accessibility

If only every other or every third bus is accessible, advanced decision time will be twice or three times as much as for able-bodied users of the system. This alternative does not meet the equivalency test for this criterion.

4. Specified Route Accessibility

This alternative would generally meet the equivalency test for advanced trip decision time because the designated routes are assumed to have the same headways as before accessibility implementation. However, there could be some increase if the user has to travel further to reach a stop on a designated route.

C. Travel Time

1. Demand Responsive Service

Travel time on a demand responsive system should be equal to or less than the travel time on a fixed route full accessibility system. The paratransit vehicle can move at speeds roughly equivalent to a private automobile and significantly faster than a fixed route vehicle.

Demand responsive service works on a shared ride principle meaning that route deviations and extra stops to take on and discharge passengers will occur. This of course means more travel time than a taxi trip with no intervening stops. However, demand responsive alternatives should be able to meet the equivalency test for travel time.

2. Fixed Route Full Accessibility

This criterion specifies that travel time between two points should be no longer on an alternate system than on a fully accessible fixed route system. An examination of the alternative transportation systems shows that most will meet this test of equivalency.

3. Specified Route Transit Accessibility.

This option will not meet the equivalency test for travel time between any two points because some points may be inaccessible or may require extra transfers. However, most points on a specified route system will have equivalent travel time to the full route system.

4. Fixed Route Partial Accessibility

Travel time between two points under this alternative should be equivalent to travel time on the full accessibility system. Total trip time will be greater under this system, but that difference is accounted for by the criterion of trip decision time.

D. Transfer Frequency

Most demand responsive alternatives do not require any transfers, making complete trips in one vehicle. These alternatives pass the equivalency test for transfer frequency.

For the MUNI system, zero or one transfer is considered normal, two are acceptable, and three are unacceptable. Partially accessible fixed route systems should have the same transfer frequency although each transfer may take more waiting time because of the greater headways. A specified route accessible system may require more transfers because not all routes are accessible. In general, the partial and the specified-route accessibility systems meet the equivalency test for transfer frequency.

E. Service Range and Coverage

These are actually two criteria, specifying that in an alternative system the hours of operation and the geographic area served should be the same as the existing fixed-route service available to the able-bodied.

The demand-responsive alternative can be designed to operate in a manner that meets this test of equivalency. In practicality, a demand-responsive system will probably cover an equivalent geographical area (i.e., the City of San Francisco) but will not have the same hours of operation.

Private taxi companies operate for 24 hours/day, as does MUNI at a reduced level-of-service, but it is difficult to foresee a demand-responsive system operating round the clock. It would be possible to maintain a low level emergency service in the late night hours, but the costs of doing so make it seem unlikely.

A fixed route partial accessibility service passes this equivalency test because it can serve the same geographic area and provide service during the same hours as the full accessibility system.

The specified-route accessibility system, however, by definition serves only a limited geographical area. It does not meet the equivalency test.

F. Fares

This criterion requires that fares on an alternate system must be no higher than those charged to the able-bodied using the regular system. The MUNI system charges a reduced fare of 5¢ (20%) to elderly and handicapped passengers but still

receives a significant amount of revenue from the fare-box due to the passengers paying the full fare. A paratransit service with fares on the same order of magnitude (5¢-25¢) would be almost totally subsidized, receiving only a small amount of revenue from passengers. Some local paratransit operations charge nothing to their passengers. By setting fares at a low level, paratransit can meet this test of equivalency.

TABLE 5.1

EQUIVALENCY CRITERIA

TRANSPORTATION ALTERNATIVES	TRIP PURPOSE	TRIP DECISION TIME	SERVICE RANGE AND COVERAGE	TRAVEL TIME	TRANSFER FREQUENCY	FARES
FIXED ROUTE						
1. Full Accessibility	Should Be The Same In All Categories As Existing Service For The Able-Bodied					
2. Specified Route Access	Not Equivalent	Equivalent	Not Equivalent In Geographic Area	Not Equivalent	Not Equivalent	Equivalent
3. Partial Accessibility	Virtually Equivalent	Not Equivalent	Equivalent	Virtually Equivalent	Equivalent	Equivalent
DEMAND-RESPONSIVE						
1. MUNI-Operated Area-wide	Unlikely To Be Equivalent	Unlikely To Be Equivalent	Unlikely To Be Equivalent With Regard To Hours Of Service	Equivalent	Equivalent	Equivalent
2. Subsidized Taxi	Equivalent	Equivalent	Equivalent	Equivalent	Equivalent	Not Equivalent
3. Contract Service	Unlikely To Be Equivalent	Unlikely To Be Equivalent	Unlikely To Be Equivalent With Regard To Hours Of Service	Equivalent	Equivalent	Equivalent

II. Institutional Criteria

Institutional criteria are a very subjective measure of the transportation alternatives. They reflect the values of various people and groups in our society. Certain of these values have become institutionalized through such means as legislation, judicial decision, or popular opinion, and they can have a powerful impact on the selection and implementation of transportation systems for the elderly and handicapped.

A. Goals and Policies

The first group of institutional criteria to be examined are the stated goals and policies of the institutions which affect transportation in San Francisco. The City Public Utilities Commission is the body that governs and makes policy for the Municipal Railway. In the previous section on Criteria, a PUC Resolution was referred to that stated that scheduled fixed-route service should be made accessible to the transit dysfunctional population including those on wheelchairs. This is a direct statement that MUNI's governing body favors fixed-route full accessibility as a goal.

The Metropolitan Transportation Commission, the federally mandated planning organization/clearing house for the Bay Area, also has power to grant or withhold federal funding from MUNI, and as a result it can establish goals and policies, regarding MUNI operations. The MTC Resolutions referred to above likewise call for scheduled fixed route transit to be made accessible to the transit-dysfunctional.

Most transit operations have to rely heavily on federal money for the purchase of new equipment, and the MTC uses this to specify that only wheelchair accessible buses can be bought after certain dates.

Although both MTC and PUC policy calls for accessible fixed-route transit as the eventual goal, these bodies have also established policies in regard to paratransit for the elderly and handicapped. The PUC has declared that it is inappropriate for MUNI to provide door-to-door demand-activated services. This coincides with the policy of fixed-route accessibility in order to meet MUNI's responsibility for providing service to the elderly and handicapped community. MTC policy requires providers of paratransit services to participate in coordinating councils or risk loss of their funding.

B. Legal Considerations

The legal considerations that affect provision of transportation services for the elderly and handicapped include some of the same policy statements listed above as well as certain federal laws and judicial decisions, especially the proposed rulemaking by DOT on the 504 regulations. As previously stated, the MTC Resolutions (299 and 467) require that fixed-route systems become accessible at a base service frequency over a period of time. Accordingly, if MUNI cannot demonstrate that it is working toward accessibility, it will not receive any funds with which to purchase new vehicles.

The federal laws and regulations that have bearing on this issue repeat and expand on the requirement that fixed-route systems be made accessible to the transit-dysfunctional. At this time, a dollar amount equal to 5% of a region's Section 5

apportionment must be spent on transportation for the elderly and handicapped. Other federal regulations specify funding levels, requirements, types of equipment to be purchased, and so forth. Overshadowing all these are the newly proposed 504 regulations.

If adopted, these regulations will require all fixed-route transit systems to be made accessible to the handicapped including those in wheelchairs. Although some exceptions may be made on a case by case basis, it is highly unlikely that MUNI would be exempt from them (except the cable car system.) What this means is that MUNI's diesel and trolley coach fleets must be made accessible along with the MUNI Metro streetcar system. In addition to purchasing only wheelchair accessible vehicles, MUNI would have to retrofit some of its existing fleet with wheelchair lifts and securement devices.

Under the 504 NPRM (Notice of Proposed Rulemaking) a Transition Plan must be submitted to UMTA by July 1, 1980. All new facilities and vehicles should be accessible, and existing facilities and vehicles should achieve program accessibility within three years for both bus systems and light-rail systems. Program accessibility for both bus and light-rail systems is defined as all off-peak service or half of peak service, whichever is greater, by vehicles accessible to the handicapped. The deadline for bus system accessibility is extended by one year for every 10% of fleet greater than 50% that operates off-peak. Light-rail system accessibility deadline may be extended to ten years if "extraordinarily expensive structural changes" are needed. The 504 NPRM also require that only Transbus, a special low-floor, ramped vehicle, be purchased after October 1, 1979.

Should MUNI or other transit agencies try to ignore these regulations, they would probably be threatened with lawsuits from disabled individuals and groups. The reader may wish to consult the 504 NPRM issued by the DOT, for a more detailed understanding of the legal requirements. However, the intent of these regulations and the other legal criteria is clear: fixed route system accessibility for the transportation-handicapped.

C. Social Integration

From an examination of the social integration criteria, one can conclude that only accessibility to fixed-route transit will allow successful integration of handicapped people into the mainstream of society. This criterion calls for the transportation handicapped to use the same transportation system and to have the same range of trip end opportunities as able bodied users of public transit. Because a demand responsive system would segregate the transportation handicapped from the transit-using public, only fixed-route system accessibility would meet the first part of the criterion.

The MUNI system has many route miles of transit lines, putting virtually any travel objective in San Francisco within the reach of transit users. Accessibility to MUNI would allow the transportation handicapped this same wide range of trip purposes. The equivalency criteria indicate that a demand responsive system would not allow as much social integration because not as many trip purposes would be served.

TABLE 5.2

INSTITUTIONAL CRITERIA

TRANSPORTATION ALTERNATIVES	GOALS & POLICIES	LEGAL CONSIDERATIONS	SOCIAL INTEGRATION
FIXED ROUTE			
1. Full Accessibility	Full Accessibility is the goal of most disabled activists. PUC policy statements support accessibility to regular fixed-route systems.	New 504 rulemaking (DOT) requires "program accessibility": at minimum 50% accessible.	Full Accessibility to Fixed-Route offers greatest opportunities to disabled for living independently ...wider range of choices.
2. Specified Route Accessibility			
3. Partial Accessibility	MTC policy statements require "program accessibility" which at minimum is equivalent to partial accessibility of existing fixed-route systems.		
DEMAND RESPONSIVE			
1. MUNI Operated Area-Wide	PUC policy statements say it is inappropriate for MUNI to operate a demand-responsive service.	Existing federal regulations say that alternate (demand-responsive) transportation must be "equivalent" to fixed-route service available to able-bodied.	Special Demand-Responsive systems segregate the elderly and handicapped from the general population.
2. Subsidized Taxi	Not accessible to all disabled.		
3. Contract Service			Same as MUNI-operated.

III. Economic Analysis*

A. Demand-Responsive Service

1. Municipal Railway Operated, Area-wide Service

Under this alternative, MUNI would provide a door-to-door demand responsive lift service. MUNI would purchase the necessary vehicles, provide drivers and dispatching, and all maintenance and operation as needed.

To provide elderly and handicapped with demand-responsive service, one special vehicle (van, small bus, etc.) would be required for each six full size vehicles regularly operated by MUNI, or 167 special vehicles. The reason for using this figure is explained above on page 56.

Capital Cost: The cost of each special vehicle is about $15,000; the cost for 167 would be $2,505,000. Though MUNI's full size coaches have an operational life of 12 to 15 years, special vehicle life is about 5 years, and the replacement rate of each vehicle would be 2.4 over the 12 year period. For the entire 12 year period, the capital costs would be 2.4 X $2,505,000 or $6,012,000 in 1978 dollars.

Operating Cost: We have assumed that operating cost for a special vehicle will be roughly the same or slightly less than the operating cost for MUNI buses and trolleys. The greatest operating costs are for the salaries of drivers and other personnel, and the driver of the special vehicles in a MUNI operated paratransit system would be paid the same wages.

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* See also Appendix A for revised cost estimates.

The present annual operating cost for MUNI buses and trolleys is $68,600. Using this figure as the annual operating cost of each special vehicle results in a total annual operating cost of $11,456,200 for the 167 vehicles. The operating cost over the entire 12 year period would therefore be $137,474,400.

Total Cost: Adding together the 12 year capital and operating costs gives a total cost of $143,486,400 for MUNI operated demand-responsive service.

2. Subsidized Taxi

This alternative involves a shared ride taxi service for the elderly and handicapped who can utilize current taxi vehicles. There are two ways of conceiving of subsidized taxi service. The first is to postulate a system that could actually be provided, based on past experience and industry practices. Because we believe that a "standard" subsidized taxi alternative would not offer comparable service when compared to other transportation alternatives, examination of a second subsidized taxi service becomes necessary. For the purpose of selecting a workable solution to the transportation problems of the elderly and handicapped community, all alternatives must be evaluated at comparable levels of service, even if this means that the subsidized taxi alternative takes on gargantuan dimensions.

A "standard" shared ride taxi service would be provided whereby the user would pay ½ fare and the other ½ would be subsidized by MUNI. Such an arrangement is referred to as a user-side subsidy, meaning that the provider of the service is not directly subsidized, but receives the subsidy after the user has taken advantage of the service. The ½ fare subsidy is a recognized industry standard used by government agencies offering such programs.

In the recent study by the Urban Mass Transportation Administration called "Summary Report of Data from The National Survey of Transportation Handicapped People", June, 1978, estimates of trip usage and patronage by transit mode were developed. Applying these national averages to San Francisco we can estimate that 14% of the Transportation Handicapped use taxis or 8,300 Transportation Handicapped use taxis. Each make 5.8 trips per month, or 48,200 passenger trips per month. Assuming the average trip cost for taxi is $3.00 under the Subsidized Taxi Alternative, the user would pay $1.50 for the fare, and MUNI would subsidize the taxi company $1.50 for the fare. The UMTA study estimates that a minimum increase in trip usage would be 10.4% per month. With the subsidy the trip increase would be about 5,000 passenger trips per month (48,200 + 5,000 = 53,200 total passenger trips per month). Many transportation handicapped still couldn't afford this service.

A second conceptualization of subsidized taxi service is necessary for three reasons:

-- The cost to the traveller is too high, exceeding all criteria concerning reasonable transportation costs.

-- Because of the high cost, the patronage level is too low meaning that this alternative provides no where near a reasonable amount of service to meet the needs of the transportation handicapped.

-- Taxi vehicles as they now exist are inaccessible to many people, especially those that use electric wheelchairs.

In the second subsidized taxi alternative, the subsidy will be set at 80%, leaving the traveller to pay 60¢ on an average $3.00 trip. This is a very low fare for taxis but still higher than the cost of the other alternatives.

These lower fares would increase the ridership substantially, and this service might then meet a sizable proportion of the potential demand from the transportation handicapped. It is very difficult to say what the ridership for such a system would be; so let us assume that it is roughly equal to projected ridership of the demand responsive alternative: 230,000 trips/month.

The cost of this alternative would be 230,000 passenger trips/month at a cost of $2.40/trip. In fact this cost estimate is almost certainly too low because use of taxis as general transportation service would result in longer trips being made. The average taxi fare could easily jump to $4.00 or $5.00, with the subsidizer still picking up 80% of the cost.

Passenger trips per month	230,000
Cost per month subsidy	$552,000
Cost per year	$6,624,000

Even with this incredible cost, the issue of making the taxis more accessible has yet to be dealt with. Prototype accessible taxis have been developed, but no one has any plans to produce them. Only government action similar to the "Transbus mandate" could spur their production. Listed below is a brief discussion of various aspects of the program alternative:

a. **Persons Eligible** - Persons who are 65 years of age or older or handicapped persons.

b. Method of Payment - Those eligible purchase a coupon book at ½ price. The coupon books contain various denomination (e.g. $10 book of coupons for $5. These books contain coupons in 50¢, 25¢, 10¢ and 5¢ denominations) that will allow the user to pay the taxi driver for the fare shown on the fare box at the end of the trip.

c. Payment of Taxicab Company - The taxi driver would turn in the coupons to the Cab Company at the end of his/her shift and receive payment. The Cab Company would send MUNI the coupons collected on a monthly basis and receive its cash reimbursement.

d. Vehicles to be Used - Standard 5 - passenger taxicab.

e. Shared Rides - The Cab Company would establish a program to encourage eligible persons to travel on a shared-ride basis and would actively try to group passengers going in the same general direction whenever possible. The cost to the passenger would be reduced whenever a shared ride condition occurred. Past experience indicates, however, that increased productivity and cost saving through group ridership is difficult to achieve.[2]

3. **Contract Services:** This demand-responsive alternative would require MUNI to purchase the vehicles and turn them over to an organization to operate the services. The organization would be responsible for two services, hiring the drivers, maintenance and operation of the service. MUNI would be responsible for the monitoring and assuring the effectiveness of the contractor.

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(2) "Analysis of Taxi Operated Transportation Services for the Handicapped," K. H. Karash, Director of State Transit Planning Staff, Boston, Mass., 1975.

Capital Cost: Again, using the 167 vehicles for an equivalency standard. The capital cost for 167 vans with wheelchair lifts would be $15,000 per van so $15,000 times 167 would be an initial capital cost of $2,505,000. Vans having a life expectancy of 5 years, the total capital cost over the next 12 years would be $6,012,000.

Operating Cost: The operating cost of paratransit on a demand-responsive door-to-door service is about $40,000 per year per vehicle. This is derived from the experience of various private non-profit organizations who are paying their staffs at rates generally lower than those paid by public mass transit operators. Based on an operating cost of $40,000 per vehicle a year the operational cost of this alternative is $6,680,000 per year. Extending the $6,680,000 over 12 years the total operating cost would be $80,160,000.

Total Cost: Adding together the 12 year capital and operating costs will give a total cost of $86,172,000 for contracted Para-Transit services.

B. Fixed-Route Service

1. MUNI Full Accessibility

In this section, estimates of capital and operating costs for a fully accessible MUNI system are shown for a 12 year period. A 12 year phasing in period was chosen because the average life of urban buses is 12 years. The costs given in this section do not include the cost of Transbus because as of now, Transbus purchase is mandated after October 1, 1979. In other words, normal replacement of worn out buses with Transbus will be required no matter what transportation services are provided as a result of this study. For the purpose of comparing the costs of different transportation alternatives, the costs of Transbus will be the same.

Capital Cost: The greatest capital cost will be the cost of retrofitting MUNI revenue vehicles (excluding cable cars) with wheelchair lifts and tie-downs. The vehicles to be retrofitted are 100 streetcars (PCC's or LRV's), 345 trolley coaches, and 200 motor coaches. Another 300 motor coaches will be replaced by Transbus. Note that the MUNI fleet as discussed here total 945 vehicles. This is due to a reduction in the size of the streetcar fleet when the changeover to the LRV is made. Estimates of retrofitting costs are $15,000 for each trolley or motor coach and $30,000 for each streetcar.[1] Capital costs of retrofitting 100 streetcars will be $3,000,000; for 200 motor coaches it will be $3,000,000; and for 345 trolley coaches it will be $5,175,000. Total retrofitting costs will be $11,175,000.

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(1) USDOT, Section 504 NPRM; also experience of San Diego Transit District.

TABLE 5.3

CAPITAL COST OF ACCESSIBLE BUSES
retrofit cost in 1978 dollars

Trolley Coaches	345 x $15,000 =	$5,175,000
Motor Coaches		
A.M. General	100 x $15,000 =	$1,500,000
General Motors*	100 x $15,000 =	$1,500,000
Streetcars		
PCC	Retire Complete Fleet	
LRV	100 x $30,000 =	$3,000,000
	RETROFIT TOTAL COST	$11,175,000
New Equipment (Transbus) 300 x $150,000		$45,000,000

* Allow 291 General Motor Coaches to be retired. MUNI will start replacement of the GM Coaches in 1981.

See also Appendix A.

Operating Cost: Caltrans estimates that total operating costs will increase 2% per vehicle as a result of their being made accessible. Present annual operating costs are $69,175 per MUNI vehicle. Full accessibility will not be achieved in one year but will be phased in over a number of years. We estimate this phasing-in period to be as follows:

TABLE 5.4

	Accessible Vehicles			Operating Costs/Year
1979	50 LRVs	100 Coaches	Total	$208,000
1980	100 LRVs	200	"	$415,000
1981	"	300	"	$554,000
1982	"	400	" + 300 Transbus	$1,107,000
1983	"	500	" "	$1,246,000
1984	"	545	" "	$1,308,000
1985 - 1990 Full Accessibility, 945 vehicles				$1,308,000

The increase in annual operating costs will be $1,384 per vehicle, reaching $1,308,000/year when all 945 vehicles are accessible. When phased in according to the above Table, the operating costs over the 12 year period will be $12,686,000.

This estimate assumes that no additional vehicles will be needed to maintain present levels of service when the fleet becomes accessible. Nor does it assume any unforeseen costs as often develop when a new technology is introduced. It is possible that additional vehicles may be needed to maintain present service levels. For a discussion of the possible financial impacts, see Appendix A.

Total Cost: The total cost for the 12 year period should be about $23,861,000 including the estimates of capital and operating costs.

TABLE 5.5

OPERATING COST TOTAL ACCESSIBILITY
in 1978 dollars

Present Annual Operation Cost Per Vehicle	*$ 69,175
Annual Operating Cost Per Vehicle Increase Resulting From Lift Operation	**$ 1,384
Total Annual Operating Cost Of An Accessible Vehicle	$ 70,559
Annual Fleet Cost Resulting From Lift Operation	1,384 x 945 = $1,308,000

* Less Cable Car Division

** CALTRANS estimates the total operating cost will increase by 2 percent as a result of lift operations.

2. MUNI Partial and Specified Route Accessibility

These options are based on the idea that half the MUNI/coach fleet will be accessible plus all the LRVs. It is assumed that retrofitting and operating cost per vehicle will be the same. Capital costs are easily calculated by halving the Full Accessibility estimate. The cost of retrofitting half the coach fleet will be $5,587,000 plus another $1,500,000 for the remainder of the LRVs: a total of $7,087,000.

The phasing in period will be somewhat different, resembling the following:

TABLE 5.6

	Accessible Vehicles		Operating Costs/Year
1979	50 LRVs	100 Coaches Total	$208,000
1980	100 LRVs	123 Coaches	$309,000
1981	"	"	$309,000
1982	"	" + 300 Transbus	$724,000
1983 - 1990	"	" "	$724,000
TOTAL			$7,342,000

The total cost of Partial/Specified Route Accessibility will be $14,429,000.

TABLE 5.7

TOTAL MONETARY COSTS FOR 12 YEAR PERIOD FROM 1979 - 1990 IN THOUSANDS OF DOLLARS FOR ELDERLY AND HANDICAPPED RIDERSHIP INCREMENT (IN CONSTANT 1978 DOLLARS)

Transportation Alternative	Capital Costs	Operating Costs	Total Costs
MUNI Operated Area-wide Service	$6,012	$137,474	$143,486
Subsidized Taxi	$0	$ 79,000	$ 79,000
Contract Service	$6,012	$ 80,160	$ 86,172
Partial Accessibility	$7,087	$ 7,342	$ 14,429
Specified-Route Accessibility	$7,087	$ 7,342	$ 14,429
Full Accessibility	$11,175	$ 12,686	$ 23,861

TABLE 5.8

COST PER PASSENGER TRIP FOR THE DIFFERENT TRANSPORTATION ALTERNAT

The total cost of each transportation alternative has been calculated for a twelv year period whereas the potential ridership increase was calculated for one month To calculate a cost per passenger trip we reconciled these figures by calculating tota cost per month: $\frac{\text{Total 12 year cost}}{144}$ = Monthly Cost.

$$\frac{\text{Monthly Cost}}{\text{Trips per Month}} = \text{Cost per Passenger Trip}$$

	MODE	MONTHLY COST	ADDITIONAL TRIPS/MONTH	COST PER TRIP
FIXED-ROUTE	FULL ACCESSIBILITY	$165,000	81,000-181,000	$0.91 to $2.03
FIXED-ROUTE	PARTIAL OR SPECIFIED ROUTE	$100,000	28,000-63,000	$1.58 to $3.57
DEMAND-RESPONSIVE	MUNI-OPERATED	$996,000	200,000(3)	$4.98
DEMAND-RESPONSIVE	CONTRACT SERVICE	$598,000	200,000(3)	$2.99
DEMAND-RESPONSIVE	SUBSIDIZED TAXI	AVERAGE TRIP FARE = $3.00		80% Subsidy = $2.4

(3) We consider this a high ridership estimate, based on use of system to full capacity.

IV. Patronage Potential

A crucial measurement for determining the utility of the transportation alternatives is to make estimates of the increased ridership that would result. The estimates for most modes are based on the National Survey of Transportation Handicapped People which asked respondents about their travel patterns and how they might change as a result of transportation improvements. At this time there is very little empirical evidence because large scale transportation systems for the elderly and handicapped have not been implemented. In addition it may be inappropriate to make predictions for one area based on the experiences of another area because of differing population and transportation characteristics.

The National Survey described the various transportation alternatives and determined from the respondents what their utilization of the alternative might be. Two estimates of latent demand were calculated: a high estimate based on all who would want to use the alternative, and a lower "barrier sensitive" estimate which accounted for problems that remain unsolved by the alternative.

A. Demand-Responsive Systems

At present we estimate that the transportation-handicapped population in San Francisco makes 1,697,000 trips/month. Based on the data in UMTA's National Survey, an accessible demand-responsive system would generate an increase in trip-making range of 10.5% or 6.9% (barrier sensitive). When added to the 60,000 trips/month currently made on paratransit systems, there is a potential of 177,000 trips/month to 238,000 trips/month.

B. Fixed Route Systems

1. Impact on Ridership of a Fully Accessible Muni System

In order to understand and evaluate the concept of a fully accessible MUNI system, estimates of present and potential patronage by transportation-handicapped individuals must be examined. There are now no direct data on MUNI patronage by the transportation-handicapped. Rough estimates can be made by applying nationally derived incidence rates of transit patronage to our estimates of San Francisco's transportation-handicapped population.

According to UMTA's National Survey, each transportation-handicapped person who lives in a "mass transit area"* makes an average of 28.6 trips/month. When this figure is applied to our estimate of 59,300 transportation-handicapped people in San Francisco, the total number of trips/month is 1,697,000.

It is difficult to estimate the number of MUNI trips that this total trip number includes because there are no modal split statistics for the transportation-handicapped. Modal split is the percentage of total trips made on a specific transportation mode or system by the target ridership group, as opposed to trips made via other means of transportation. A modal split can be derived, however, from data in the National Survey. The nationwide modal split for bus is 12% for the transportation-handicapped and 9% for the able-bodied, a difference in rate of 1/3. It may seem unusual that the transportation handicapped make a higher proportion of their trips by transit than do the able-bodied. The reader should remember that the transportation handicapped make far fewer trips in total than the able-bodied (28.6 trips/month vs. 54.8 trips/month). Because many of the transportation handicapped

*All of the City of San Francisco would meet this definition.

lack the money necessary for travel by taxis or private cars, those that can use mass transit with some degree of difficulty do use it rather extensively. The modal split for transit in San Francisco is 12.3% for the entire MUNI system. This is for the total population. Since the nation-wide transit modal split is greater for the transportation-handicapped than for the able-bodied, these San Francisco modal splits can be increased at the same rate, thereby obtaining a new modal split of 16.3% for the entire system for San Francisco's transportation-handicapped population.

When this modal split is applied to the total number of trips/month made by the transportation-handicapped, the estimated number of MUNI trips/month that they make is 276,600.

The National Survey has defined a transit full accessibility option that includes a feeder system, and it estimates that full accessibility would increase the total number of trips made by the transportation-handicapped by a range of from 4.8% to 10.7%.

If the maximum increase, 10.7%, took place, there would be 181,600 additional trips/month in San Francisco. Since these trips by definition will all occur on the transit mode, trips on MUNI by the transportation-handicapped would increase by 65.6%.

The lower estimate of 4.8% yields 81,450 additional trips, an increase for MUNI of 29%. This lower modal split is based on the idea that not all of the transportation-handicapped who say that they will use a fully accessible system will actually be able to. According to the National Survey some of the people who want to use a fully

accessible transit system will still confront barriers that will not be removed in a so-called fully accessible system. The barriers that would still exist include frequency of service, fear of using or riding alone, the bus not going to where the person wants, and not being able to afford it.

However, these barriers would seem to have less impact here in San Francisco than in other cities because of the extensiveness of the MUNI system. Buses run frequently, with an average headway of around ten minutes. There are many route-miles; most San Francisco residents are no more than two blocks from a transit line. Fares are very low with elderly and handicapped people paying only a nickel. The barriers that actually prevent people from using the MUNI system are not these but are rather the typical physical barriers such as boarding vehicles or having to ride while standing. For these reasons, the increase in trips if the MUNI system were fully accessible, should be closer to 10.7% than 4.8%.

TABLE 5.9
PARATRANSIT TRIP MAKING

All modes:	1,697,000	Current trip making/month with 6.9% Trip increase, 117,100 more trips/month On Paratransit.
		With 10.5% increase, 178,200 more Trips/month on Paratransit.

Add to this:

Current trip making on Paratransit = 60,000 trips/month.

Total		177,100	trips/month
	to	238,200	trips/month
"		2,125,000	trips/year
	to	2,858,000	trips/year
"		25,502,000	trips in 12 years
	to	34,296,000	trips in 12 years

Source: SUMMARY REPORT OF DATA FROM THE NATIONAL SURVEY OF TRANSPORTATION HANDICAPPED PEOPLE

2. Impact on Ridership of a Partially Accessible or Specified Route MUNI System

In the previous section, the National Survey used an estimate of a 10.7% increase in tripmaking if transit systems were to become fully accessible. The National Survey, however, makes no estimates of tripmaking increase for a system made partially accessible. Would a 50% accessible system experience half the increase or 5.4%?

According to A Fundamental Traffic Model[5] patronage decreases geometrically when only some lines or runs in the entire system are accessible. That is, a system with only half of its lines accessible would have ½ x ½ or ¼ of the ridership from transportation-handicapped people as compared to if all lines were accessible. This is because half the people are eliminated at each end of the trip. At the origin end, only half the potential ridership can use the system; but this number is again reduced by half because the system will only serve half the destinations that these riders wish to reach. The small amount of experience that mass transit systems have had with partial accessibility demonstrates this point.[6]

This same relationship holds true for partial accessibility over both space (number of accessible lines) and time (number of accessible runs). However, in the real world some locations are of more importance than others, and some specified routes to serve identified demand may be indicated. Partial accessibility for MUNI as defined in this study includes half the coach fleet and all the streetcar fleet being accessible.

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(5) D. K. Goodrich, A Fundamental Traffic Model, California Department of Transportation, 1966.

(6) American Public Transit Association, Passenger Transport, Vol. 36, No. 32, 8/11/78.

This is equivalent to 58% of total MUNI capacity. By squaring this number (.58) according to the system defined in A Fundamental Traffic Model, we estimate that the patronage increase would be one-third (.33) of that experienced by a fully accessible system.

Could partial accessibility meet the needs of San Francisco's elderly and handicapped population? Partial accessibility would have much lower patronage than a fully accessible system for the reasons listed above. If only half the money were spent, the return in utilized transportation service would be only one quarter, and the elderly and handicapped would still confront a situation of inferior service and reduced opportunities. This situation would be inimical to the various legal and policy considerations that frame the entire issue of transportation for the elderly and handicapped. Partial accessibility can be an important step on the way to full accessibility but should not be considered as an overall solution to the problem.

TABLE 5.10

RIDERSHIP IMPACTS OF FULL ACCESSIBILITY

28.6	trips/month per person.
X 59,300	TH (Transportation Handicapped) individuals in San Francisco.
1,697,000	Estimated total trips/month.

MODAL SPLIT

12%	Nationwide modal split for Bus by TH population.
9%	Nationwide modal split for Bus for Able-bodied.
12% = 1.333 X 9%	

12.3%	Modal split for MUNI for all riders.
X 1.333	To maintain same nationwide ratio.
16.3%	Derived MUNI modal split for TH population.

16.3%	Derived modal split.
X 1,697,000	Trips/month, San Francisco's TH population.
276,600	Estimated trips/month on MUNI at present time.

10.7%	Increase in total trip making, full accessibility.
X 1,697,000	Total trips/month, TH population.
181,600	Additional trips/month on MUNI.

181,600 ÷	Additional trips/month.
276,600 =	Current trips/month on MUNI.
65.6%	Increase.

181,600	Additional trips/month.
+ 276,600	Current trips/month.
458,200	Estimated total trips/month by TH on fully accessible MUNI.

TABLE 5.11

ELDERLY & HANDICAPPED PATRONAGE POTENTIAL BY MODE

MODE	CURRENT TRIPMAKING	INCREASE IN TRIPMAKING	TOTAL AFTER IMPLEMENTATIO
MUNI Full Accessibility	276,000/month[7]	81,000 to 181,000	357,000/month to 458,000/month
Partial or Specified Route Accessibility	276,000/month[7]	27,000 to 60,000	303,000/month to 336,000/month
MUNI operated Area-wide (Demand-responsive)	--	117,000 to 178,000	117,000/month to 178,000/month
Subsidized Taxi	48,200/month[8]	182,000	230,000/month
Contract Service	60,000/month	117,000 to 178,000	177,000/month to 238,000/month

(7) 276,000 is our estimate of trips/month currently made on MUNI as it now exists by those transportation-handicapped who are able to ride the system.

(8) An estimated 48,200 trips/month are currently made on existing unsubsidized taxis by the transportation handicapped.

SUMMARY TABLE 5.12

CRITERIA

	TRANSPORTATION ALTERNATIVES	EQUIVALENCY CRITERIA	INSTITUTIONAL CRITERIA	(TOTAL COST FOR 12 YEAR PERIOD) ECONOMIC CRITERIA	(INCREASE) RIDERSHIP POTENTIAL
FIXED-ROUTE SYSTEMS	Full Accessibility	Same Level of Service as for Able-Bodied Users of Transit	Optimum Alternative Meets all requirements	$23,861,000	81,000 to 181,000/month
	Specified Route Accessibility	Not Equivalent with regard to 1. Area Served 2. Travel Time 3. Transfer Frequency	Minimum Level Conformance	$14,429,000	27,000 to 60,000/month
	Partial Accessibility	Longer Trip Decision Time Travel Time	Minimum Level Conformance	$14,429,000	27,000 to 60,000/month
DEMAND-RESPONSIVE SYSTEMS	MUNI Operated Area Wide	Not Equivalent in 1. Trip Purpose 2. Trip Decision Time 3. Hours of Service	Not in Conformance with PUC policy Does not integrate E&H with general population	$143,486,000 based on 167 vehicles	117,000 to 178,000/month
	Subsidized Taxi	Not Equivalent in Cost to Passenger	Not Accessible To all Handicapped Does not integrate E&H with general population	$79,000,000 based on 80% subsidy, high patronage	182,000/month
	Contract Service	Same as Muni-Operated	Does not integrate E&H with general population	$86,172,000	117,000 to 178,000/month

CHAPTER 6

BOARD OF CONTROL RECOMMENDATIONS

I. The MUNI Fixed Route System Should Be Made Fully Accessible To The Elderly And Handicapped.

This is the alternative that best meets the criteria in the Transportation Study, criteria that this Board of Control approves. The Study data support this conclusion and indicate that fixed route full accessibility is the most cost effective alternative and that its costs would not increase significantly with patronage increases. This is not true of the Demand-Responsive alternatives for which costs will rise directly with patronage increases. Furthermore, many of the changes needed to make MUNI accessible to the elderly and handicapped will provide more comfortable service for the general transit riding public. In making this recommendation, the Board of Control asked MUNI staff to analyze the operational impacts of full accessibility. The resulting analysis is Appendix A to the MUNI Elderly and Handicapped Transportation Plan.

A. MUNI Metro should be accessible when put into operation.

The handicapped community recognizes the distinction between accessibility to existing transit services and new transit systems. As a new system, MUNI Metro is expected to be accessible by the public and by this Board of Control. However, the Board realizes that some development time will be needed to perfect and produce an acceptable lift or ramp for the LRVs because that designed by Boeing has been rejected by MUNI. Since MUNI Metro is a major

trunkline from different parts of the City to the central business district, and since some delay is anticipated in making the MUNI Metro accessible to the handicapped, the Public Utilities Commission must make MUNI Metro accessibility an item of the highest priority.

B. **The MUNI coach fleet (diesel and electric) should be made fully accessible by implementing a scheduled program to retrofit existing coaches with accessibility devices and by purchasing only accessible vehicles when older MUNI coaches are retired from service.**

Muni's retrofit program should begin in 1979, converting 100 vehicles per year until the entire fleet has been made accessible either by retrofitting or by the purchase of new vehicles. This process should be completed by 1985. For operational reasons beneficial to both handicapped patrons and MUNI, wheelchair lifts and ramps should be located at the front door of all vehicles.

C. **The overall problem of boarding and leaving the transit vehicles, including waiting at the loading zone, mounting the vehicle, paying the fare, and safely finding a seat is critical to the operation of an accessible transit system.**

All accessible vehicles should include a design feature (such as lower steps, kneeling front end, handrails) to allow easier ingress and egress for those who are disabled but ambulatory, especially the elderly. Because transit accessibility includes more than accommodations for the wheelchair users, modifications must be made so that people with various other disabilities can use the MUNI system. These should include handles, rails, protective barriers, and available space for the elderly and handicapped at the front of the vehicle.

In particular, MUNI should seek the development of a versatile wheelchair lift which would include other accessibility features, such as a retractable step, in the same package as the lift.

The availability of the bus loading zone must be assured. When the bus can pull into the curb, it greatly reduces the height of the first and most difficult step. Pulling into the curb will be even more important when wheelchair lifts are in service on MUNI coaches. When possible, Polk Street-type sidewalk extensions should be built for bus loading zones.

D. **Because technology for transit accessibility is in its first generation, its "state of the art" should be continually explored by MUNI and improvements incorporated into the MUNI system.**

MUNI should establish an "Accessibility Technical Advisory Committee" comprised primarily of disabled individuals with experience in the field of transportation accessibility and mobility.

E. **MUNI needs to establish a marketing and community outreach program to actively seek increased patronage among the elderly and handicapped.**

The Board of Control and staff realize that accessibility to MUNI involves more than the acquisition of special vehicles and equipment. It also involves operating the MUNI system in a manner which allows and encourages maximum use by the elderly and handicapped.

The functions of this program would include identifying those who could never use transit and the reasons for this; identifying those elderly and handicapped who don't want to use MUNI and the reasons for this. A marketing program can insure higher returns on society's investment in accessibility by maximizing the number of elderly and handicapped passengers.

This program would also include:

- Educating the general public about the operation and importance of MUNI accessibility.

- Travel training for the elderly and handicapped.

- Training for social service agency personnel to teach their clients about riding MUNI.

During the second phase of the MUNI Elderly and Handicapped Program, the Board of Control will pursue in greater detail the various administrative and opertional changes necessary to make MUNI truly accessible.

F. **The existing drivers' training program should be expanded with regard to accessibility**, including sensitivity to the conditions and needs of the elderly and handicapped and operating instructions for accessibility equipment.

II. Other Transportation Services

As a result of the research conducted during the Elderly and Handicapped Transportation Study and the comments received during the public hearings on that Study, the staff has identified two groups of people who may not be well served by an accessible MUNI fixed route system. For them, MUNI fixed route service must be supplemented by other transportation services. The two groups are:

1. Those people, primarily elderly, who will not choose to use the MUNI because

   - They feel that walking from their homes to a transit stop is unsafe due to street crime, especially at night.
   - They consider themselves too feeble or in some ways physically unable to use fixed route transit.
   - They have used a car all their lives and are psychologically unable to begin using mass transit, and nolonger are able to drive due to the physical deterioration that accompanies aging.

The Board of Control believes that the elderly are entitled to some privileges due to their age and the fact that they have been productive contributors to society for many years. Unlike a great many handicapped people who desire "mainstreaming" - use of and participation in the same institutions as the able-boded - many elderly people prefer the convenience and security of institutions specifically addressed to their needs. This applies to transportation; many elderly people would prefer a specialized transportation system, not used by the general public.

2. It is generally assumed that some people will never be able to use accessible fixed-route transit in the forseeable future. Examples include the following:

   - Those who travel in gurneys, a horizontal cart on wheels.
   - Those with severe multiple handicaps.
   - Those who are severly mentally retarded.

Handicapped people have long had to combat the attitude that no handicapped person should or would use public transportation. We recommend that this assumption not be applied until a study of the individual situation forces that conclusion. For example, some people with severe handicaps may be able to use accessible transit with the help of attendants or travel training. However, it would not be the responsibility of the transit operator to supply attendant care or training.

A. <u>MUNI should establish a pilot off-peak charter and shuttle service (using regular MUNI vehicles) for groups of elderly and ambulatory handicapped.</u>

During the midday some vehicles and operators are idle. For a relatively small cost, MUNI could provide five (5) vehicles and operators, each making two round trips per day, to offer charter type trips to seniors and other qualified groups. We believe that a target of 50 round trips per five day week is realistic and would be a great service for seniors and other groups wishing to make shopping, social, recreational and other types of trips. We estimate this service would provide 1,500 passenger round trips per week. In addition, such a program would relieve pressure on the various paratranist operators in the

City, many of whom are operating at their full capability. We believe that a program of this type would generate a very high return on a relatively small investment. Experience from other cities has that users of similar service look forward to such outings with enthusiasm.

Eventually, this service could develop into regular specified routes for the elderly and handicapped. Precedent for such specified route service exists in the form of MUNI's special shuttles for football and bseball games and for opera performances.

This charter-type service would be expanded to accommodate the nonambulatory handicapped when MUNI has acquired enough lift equipped vehicles. Expansion to more than five vehicles per day could be indicated if the program operates smoothly and if there is demand for more trips.

B. <u>MUNI should participate in a county-wide paratransit coordinating council.</u>

A paratransit coordinating council would encourage more effective utilization of existing paratransit resources. MUNI has the resources and staff expertise to provide valuable technical assistance to a coordinating council and to individual paratransit operators. Furthermore, MTC regulations require MUNI participation in, though not necessarily leadership of, such a council.

During the early phases of the MUNI accessibility program, the Coordinating Council can work toward using available paratransit vehicles as a feeder service to those MUNI routes which are accessible.

The Board of Control believes that nonprofit agencies should continue to operate paratransit services with the help of various state and federal grant programs, but not with funds that could be used for MUNI fixed-route service. Public Utilities Commission resolution has declared that it is inappropriate for MUNI, a mass transit service, to provide door-to-door transportation services.

The combination of a fully accessible MUNI fixed-route system and existing paratransit services participating with MUNI in a coordinating council will be of overall benefit to the elderly and handicapped people of San Francisco.

APPENDIX A

OPERATIONAL IMPACTS OF FULL ACCESSIBILITY ON THE MUNI SYSTEM

PREPARED BY

MEMBERS OF THE MUNI ELDERLY AND HANDICAPPED PROGRAM, SCHEDULES AND TRANSPORTATION DEPARTMENT AND PLANNING DIVISION

The Staff of the San Francisco Municipal Railway was requested to do an operational impact of fixed-route full accessibility by the Elderly and Handicapped Program's Board of Control. None of the other alternatives discussed in the main body of the Transportation Plan will have a similar analysis because the Board of Control has recommended this alternative alone as the most appropriate solution to meet the mobility needs of the elderly and handicapped of San Francisco. It is therefore reasonable to examine this alternative in more detail. By doing so, MUNI can begin the planning process with the purpose of minimizing any negative impacts that may occur on the operations of the MUNI system. It should be noted that fixed-route full accessibility would not take place for several years, and the situation described in this Appendix reflects hypothetical conditions of the mid to late 1980's.

In order to successfully operate a transit system that is accessible to the handicapped, including those who use wheelchairs, it is necessary to predict what impacts will occur on the day-to-day operation of coaches. This is especially important for the MUNI system which receives heavy ridership during the peak hours and throughout the midday. A common feeling among those who know MUNI is that the system is now operating at capacity and making the system accessible to people using wheelchairs would necessitate an increase in MUNI capacity. This is due to the time required for wheelchair passengers to board and leave the coach. This paper will examine whether or not such an increase is called for and if so, how much extra capacity is needed to maintain present levels of service and accommodate all passengers in wheelchairs.

According to the MUNI Elderly and Handicapped Transportation Study, there are approximately 2,000 San Franciscans who would require the use of a lift or ramp to board and leave MUNI coaches. Most of these people use wheelchairs, though this number includes people who use walkers and can't climb stairs or steps. Because there is no transit system totally accessible to the handicapped, there are no reliable trip making rates to determine the number of trips on MUNI that these people would make. We have used various statistics, including transit trips per person on MUNI, trip making by all transportation handicapped, and the age makeup of the 2,000 potential wheelchair lift users to estimate their daily ridership on the MUNI system. A reasonable estimate is that there will be 300 round trips per day, requiring the use of wheelchair lifts once the system is near total accessibility. This means 600 one way trips and probably more when transfers are also considered.

Because of the above-mentioned lack of accessibility experience, and the unreliability of much presently used lift and securement equipment; it is also difficult to estimate the amount of time required for wheelchair travelers to board and leave the bus. Information from other transit properties indicates that the average time for this is about 1½ minutes. This could be shortened considerably when the passenger is familiar with the system or when improvements are made in equipment design. The time could also be longer when the buses are loaded with standees during the peak travel periods. Although travel patterns of the transportation-handicapped are not as highly peaked as those of the able-bodied, MUNI should expect some peak period travel by wheelchair users. In addition, many MUNI coach lines are crowded with standees during the off peak hours. These conditions make boarding and leaving by wheelchair passengers more difficult and time consuming.

Discussions were held with MUNI Scheduling and Transportation personnel to determine the impacts of the estimated level of wheelchair lift used on day-to-day operation. In particular, we attempted to measure the level of extra effort needed to maintain present levels of service and accommodate wheelchair passengers. The Scheduling and Transporation people felt that four minutes recovery time should be added onto each wheelchair trip: 1½ minutes boarding plus 1½ minutes leaving, plus a minute margin for trips on crowded coaches and as a general margin of safety. Note that although a significant proportion of wheelchair trips will occur on the MUNI Light Rail mode, we have calculated the impacts of the 600 trips as though they were all on MUNI coachlines. Exactly when and where these trips will occur cannot be determined in advance; therefore the Scheduling Department feels that the only way to insure maintenance of current service levels is to add four minutes layover time onto all of the MUNI's 6,200 weekday coach trips. This gives a total of 24,800 minutes or 413 hours extra time. Divided by 8 hours (typical operator's shift) this indicates 51 additional operators will be needed as well as about 21 additional coaches. A few additional operators and coaches would be required on weekends of the busiest routes.

Although this extra capacity was calculated by considering wheelchair lift use on all MUNI trips, it is not possible to equally allocate twenty-one (21) coaches onto approximately 70 different coach lines. In other words, extra capacity will be available for the more crucial lines but not for all of them. Random ridership and use of wheelchair lifts could cause some slowdowns even with the proposed extra capacity. It will be the responsibility of the Transportation and Scheduling personnel to allocate MUNI vehicles where and when they are needed the most. Important

factors will be relationship of patronage to capacity and the determination of regular ridership patterns by wheelchair users for the various coach lines. Only when MUNI becomes accessible will it develop the most effective ways to use this increased capacity.

In theory these service increases would be enough to accommodate a wheelchair passenger on each of MUNI's 6,200 weekday trips, even though we estimate only 600 to 700 wheelchair trips. This level of service increase is necessary because of the random occurrence of the wheelchair trips. All MUNI coach trips have to be able to accommodate any delay in order to maintain schedules even though most trips will not carry passengers in wheelchairs.

What this means is an improvement in service for all MUNI passengers. There are many existing conditions that cause delays and schedule breakdowns for MUNI coaches, including traffic accidents and tie-ups, construction, fires, and other random occurrences. The service increases necessitated by accessibility and use of wheelchair lifts would result in a capacity that could be applied to other delaying factors as well, and the overall scheduling of MUNI coach runs will become more reliable.

TABLE A-1

ANNUAL COSTS OF FULL ACCESSIBILITY OPERATION (1978 DOLLARS)

1.	Lift Operation on Existing Fleet	$1,308,000
	(945 vehicles)	
2.	Additional Vehicles (21 coaches)	
	51 Operators . . .	944,000
	Regular Maintenance	290,000
	Lift Maintenance	29,000
	SUBTOTAL	$1,263,000
3.	TOTAL	$2,571,000

Note that operating costs will not reach this level until MUNI is fully accessible in the mid 1980's.

TABLE A-2

CAPITAL COST OF ACCESSIBLE VEHICLES IN 1978 DOLLARS

1. RETROFIT COSTS

Trolley Coaches	345 x $15,000 = $5,175,000
Motor Coaches	
A.M. General	100 x $15,000 = $1,500,000
General Motors	100 x $15,000 = $1,500,000
Streetcars	
PCC	Retire Complete Fleet
LRV	100 x $30,000 = $3,000,000
TOTAL RETROFIT COSTS	$11,175,000

2. NEW EQUIPMENT COSTS

Transbus	300 x $150,000 = $45,000,000

The cost of Transbus does not effect the comparison of the alternatives (fixed-route accessibility versus separate paratransit service) because current federal regulations require purchase of only Transbus after a certain date, regardless of what MUNI decides

to do concerning accessibility. It is also true that only a portion of the cost of Transbus should be included under Total Capital Costs of Accessibility. Some of its costs are due to accessibility, some due to general design improvements for the benefit of all passengers, and most of its cost is the basic cost of building a diesel bus. Only that part of the cost that can be attributed to accessibility should be included, but it is difficult to separate out that cost because so many new design features have been built into Transbus. A reasonable estimate of the cost of this accessibility component would be $20,000 per vehicle. This does not include the cost of the low floor design, which is the major reason for the high price of Transbus. By adding this $20,000 per each of 300 Tranbuses to the retrofit costs above, a new total capital cost of accessibility estimate is obtained:

3. TOTAL CAPITAL COSTS

Retrofit Costs		$11,175,000
Transbus Costs	300 x $20,000 =	$ 6,000,000
TOTAL		$17,175,000